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MULTILEVEL MODEL OF QUALITY OF LIFE AMONG U.S. VETERANS WITH SERIOUS MENTAL ILLNESS

by

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of the requirements for the degree of
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DEDICATION

This study is dedicated with love and deep gratitude to my husband, Paul Merryman, for his untiring support and encouragement.

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TABLE OF CONTENTS

LIST OF TABLES

Tables

LIST OF FIGURES

Figures

LIST OF APPENDICES

Appendix

CHAPTER I

INTRODUCTION AND BACKGROUND: PSYCHIATRIC DEINSTITUTIONALIZATION AND THE COMMUNITY MENTAL HEALTH MOVEMENT

The impetus to deinstitutionalize mental patients and instead offer them community-based care began in the early 1960's with the advent of psychotropic drugs and the emergence of the civil rights movement. A heightened awareness about involuntary commitment and poor conditions in mental hospitals and a growing concern over rising health care costs, also motivated deinstitutionalization.[1,2] Recently, much criticism has been leveled against deinstitutionalization, challenging the relative merits of community-based care. Critics argue that many persons, particularly those with serious mental illness (SMI), have "fallen through the cracks" left without housing and basic subsistence requirements which would have been provided in an institutional setting.[3,4,5,6,7]

Furthermore, concerns about persons with SMI have been increasing with the rising number of homeless individuals, since there are a disproportionate number of persons with serious mental illness among them. This rise in homelessness has sparked concern among professionals, researchers, and the general public about psychiatric deinstitutionalization and the large numbers of mental patients discharged to the community. A heightened interest has developed about the social conditions of persons with SMI treated in an outpatient setting. After all, what has been gained by shifting

persons from the inpatient to outpatient sector? Have we saved money, improved mental health treatment, or enhanced the quality of life of the person with SMI?

It is the latter issue with which this study is primarily concerned. I argue here that it is important to understand the life circumstances of persons with serious mental illness as they move into a community living environment in terms of what they actually do and experience and their own feelings about these experiences.[8] This study investigates the quality of life of U.S. veterans with a history of psychiatric institutionalization as they make the transition into a community living environment.

THE PRESENT STUDY: AN OVERVIEW

The present study investigates the relative impact of social structural and client characteristics on the quality of life of U.S. veterans with SMI. I begin by providing a general description of serious mental illness and its effect on the individual in society. Next, I describe the particular sub-population included in this study, namely, U.S. veterans with SMI. Finally, I outline the study's central research questions and its research and policy implications.

Serious Mental Illness

During the course of a lifetime, approximately 1% of the population will be affected by schizophrenia and 8% by affective disorders, two primary diagnostic categorizations of serious mental illness.[9,10] Schizophrenia, in particular, tends to occur initially in early adulthood, when the affected person may be trying to start a career or obtain post-secondary education. These plans often become difficult or impossible to pursue in the face of a debilitating illness that hampers psycho-social functioning. Often symptoms flare-up throughout one's life, making it difficult to maintain healthy relationships and employment. Psychotropic medication can often control psychotic

symptoms, but such medication may do little to prevent future relapse and functional decline.[11]

The social costs of serious mental illness are significant. For schizophrenia, treatment costs alone exceed $7 billion annually, with such additive indirect costs as social services and loss of productivity accounting for twice that amount. This financial burden is roughly equal to that of all cancers combined.[12] In addition to schizophrenia, other categories of serious mental illness (such as affective disorders) also interfere with psycho-social functioning. Affective disorders often result in broken social relationships, unemployment and residential instability, all events that indicate a poor quality of life. Furthermore, the personal and social costs associated with these events are substantial.

U.S. Veterans with Serious Mental Illness

It is particularly important to investigate the aftermath of the deinstitutionalization process for the U.S. veteran with serious mental illness, as there is a higher rate of serious mental illness and homelessness among the veteran population.[13] Additionally, a recent GAO report found that discharge planning staff seldom monitor veterans' progress after their release from VHA psychiatric inpatient facilities due to inadequate staffing, difficulties in maintaining contact, and resistance by some veterans to continued VHA involvement in their lives.[14]

The Department of Veterans Affairs (VA) has a mandated responsibility to provide health care services to veterans. Because, in recent years, funding for general social welfare and community service programs has been declining, the VA will likely become "the provider of last resort" for many low-income, SMI veterans.[15] At present, approximately 326,000 veterans with SMI use the VA service system annually. However, the potential population of veterans with SMI, as suggested by the National

Co-Morbidity Study, (National Advisory Mental Health Council, 1993) is 630,000, representing 2.3% of the U.S. veteran population.

Historically, the Veterans Health Administration (VHA) has focused on hospital-based care for persons with SMI. The VHA has concentrated its resources for the mentally ill more on the inpatient sector ($1.3 billion annually) than the outpatient sector ($225 million annually). "The VHA continues to maintain separate facilities which are primarily focused on the provision of care to psychiatric clients. These facilities...are often geographically removed from the population clusters of veterans they are designed to serve."[16] Although the VHA maintains a wide-array of outpatient-based services, they direct their most resource-intensive efforts at an inpatient-based delivery system. The VHA is focused on changing this situation by supporting further deinstitutionalization of the SMI veteran population and providing greater resources for the expansion of community-based ambulatory services. This shift provides a unique opportunity to study the consequences of psychiatric deinstitutionalization for a sub-population of U.S. veterans with SMI.

Central Research Questions

This study investigates changes in quality of life over time for a group of veterans with serious mental illness. I explore the relationship between social structural characteristics, individual attributes, and quality of life. I give specific attention to the elements of the individual and/or their treatment environment that explain different aspects of the quality of their lives. I am interested in the extent to which quality of life is related to such environmental contingencies as case management provision, compared to such client limitations and strengths as clinical functioning. The central research questions include:

(1) How do different aspects of the client's psychiatric profile impact quality of life?

(2) How does case management exposure influence quality of life?

(3) How do programs oriented toward structured support influence quality of life?

(4) How does case management moderate the effect of different aspects of the client's psychiatric profile on quality of life?

(5) How do programs oriented toward structured support moderate the effect of different aspects of the client's psychiatric profile on quality of life?

Research and Policy Implications

In answering these research questions, this study represents a worthwhile contribution by allowing a thorough investigation of the longitudinal effects of serious mental illness on the individual client's quality of life. There are longitudinal patterns of mental illness and individual-environment interactions that contribute to these patterns.[17,18] This study explores these patterns, leading to an expanded understanding of the process of social integration for the individual with serious mental illness, a largely unaddressed area.[19]

This study's findings are useful for three different audiences: (1) researchers, (2) policy-makers and (3) clinicians and managers. Researchers are informed by my analytical approach, where I model the effects of client and program characteristics on

changing aspects of client well-being over time. These sophisticated modeling techniques allow the researcher to investigate the interaction between individuals and their social environment. Policy-makers are provided with rich outcome data, beyond the narrow clinical indicators typically used in research on the mentally ill. Past failures of mental health service policies adopted in the wake of deinstitutionalization may be avoided by evaluating the changing life circumstances of people with serious mental illness in outpatient settings. Particularly, policy-makers are informed about the social conditions of the seriously mentally ill across a variety of quality of life domains. Clinicians and managers are assisted in designing optimal treatment options for different clients under varying circumstances. Treatment strategies should vary among SMI sub-populations. Additionally, specific areas of quality of life may reveal themselves as particularly problematic, requiring increased attention from clinicians and managers to specific social issues. In general, I hope this study contributes to designing appropriate programs that match client needs and increases our understanding of the social integration process for persons with serious mental illness.

CONSEQUENCES OF DEINSTITUTIONALIZATION

We must first understand the consequences of psychiatric deinstitutionalization. Much criticism about psychiatric deinstitutionalization relates to the over-emphasis of the "least restrictive" setting.[20] A commonly held belief by many in the deinstitutionalization movement is that by placing individuals in the "least restrictive" setting their quality of life will be improved.[21] Many argue the need for a new ideology for the post institutional era that recognizes the inexact nature of the term "least restrictive". Each client should be assessed individually to determine which institution is best suited to his or her symptomatology, level of functioning, and personal choice.[22,23,24,25] For example, the concept of "least restrictive setting" does not consider the individual needs of former mental patients nor the particular resources available in the community.

An implication of this type of criticism of deinstitutionalization is the need to expand the concept of quality of life to address the availability of social resources and support in the community. Quality of life is not simply individually determined. From systems theory we know that quality of life is determined by the functional capacity of the interacting social systems in the community.[26] Functional capacity can be defined as well-funded community mental health centers, housing resources, social support and linkage to institutional mental health services which provide a network or continuum of services. The functional capacity of this network affects the quality of life of the individual client in the community.[27,28,29] While peoples' needs for food, clothing and temporary shelter generally can be served by community providers, mental health, general health, substance abuse, and the need for stable housing present more pressing issues.

Most critics agree that the community mental health movement has failed, in part due both to inadequate resources provided in the community and to a general lack of ongoing client contact and follow-up. Here, failure would be defined in part by readmission to a psychiatric inpatient setting, homelessness, and engagement in criminal activities. In order to prevent these undesirable outcomes from recurring, numerous supportive treatment programs and strategies have been proposed and implemented.

In general, persons with SMI display low levels of educational, financial, and vocational achievement compared to the general population.[30] With an increase in the numbers of persons with SMI in the community, there was a concurrent increase in the visibility of the functional limitations of this population. This has led some policy

makers to redirect attention to supportive treatment approaches that attempt to improve the functioning of persons with SMI. Supportive treatment approaches focus on improving the functional ability of persons with SMI and helping clients to obtain services and goods such as food, shelter, clothing, medication and therapy.[31,32]

One such supportive treatment approach - case management - was introduced as a mechanism to assist clients in navigating the service system and obtaining needed services. At the same time, psycho-social rehabilitation efforts are directed at improving clients' functional abilities.[33,34,35] Together, case management and psycho-social rehabilitation services are expected to help persons with SMI with the following problems: impairment due to symptoms, role dysfunction due to disability, and limited opportunity due to disadvantage.[36] These additional supportive treatment components have been expected to improve the plight of persons with SMI in the post-institutional era.

PROGRAMMATIC SOLUTIONS: ASSESSMENT OF OUTCOMES

Over the past several decades, there have been hundreds of studies investigating the effect of these supportive treatment programs on persons with mental illness. This section reviews the literature focused on treatment and outcomes research related to persons with serious mental illness (SMI) who receive community-based mental health services. Although there is a substantial literature on this subject, few studies have attempted to measure the effects of personal attributes and treatment environment

characteristics concurrently on mental health outcomes, nor have these studies examined these relationships over time.

Literature Review

I conducted a comprehensive literature review on outcome studies of persons with serious mental illness. Details of the literature review process and results are contained in Appendix A. Table 1.1 lists the 132 studies reviewed. The summary table displays the authors' names, year of publication, study sample size and study design. Designs included: experimental studies which utilized a randomized control trial (RCT) framework; quasi-experimental studies with a pre- and post-test format, matched group comparisons or two-cohort designs; and non-experimental studies which incorporated retrospective review, cross-sectional surveys, study combinations and non-matched group comparisons.

These studies can be categorized by central focus, as displayed in Figure 1.1. The research varies widely from studies focused on such clinical outcomes as changes in functional status and readmission rates to studies focused on community adjustment and quality of life. Most studies included several independent variables that were associated with setting, treatment and/or person-related factors. These three focus areas -- setting, treatment and person -- provide an organizational framework for assessing the strengths and weaknesses of this body of literature.

Setting-focused Studies

Many studies focused on setting have assessed the relative merits of an inpatient versus an outpatient setting or, simply, the aftermath of psychiatric discharge on a variety of client outcomes: re-hospitalization, clinical status, and psycho-social functioning. A seminal study in this area is Stein and Test's randomized controlled study (1980) of persons with serious mental illness either participating in an experimental community program or remaining in an inpatient psychiatric setting[37]. This study analyzed several outcomes over 14 months: number of hospitalizations, community tenure, and measures of community adjustment. Overall, the community group performed better on these outcome measures than those remaining in institutional care. However, when the community program was discontinued, hospital use rose sharply. Clearly, long-term outcomes are needed in order to assess such environmental changes as program discontinuation, which greatly affect what happens to clients.

A recent review article summarized the findings of the bulk of these setting-focused post-discharge studies.[38] Overall, these studies indicate that the following factors are strongly related to a variety of client outcomes (for example, recidivism, clinical functioning, and community tenure): medication use[39,40,41,42,43], number of prior hospitalizations[44,45,46,47], type of onset[48,49,50], age at onset of illness[51,52,53,54,55] and marital status[56,57,58,59]. Moderate predictors of these same outcomes include diagnostic category[60,61,62], presence of precipitating factors[63,64,65], duration of illness[66,67] and gender[68,69,70,71]. However, several studies found no significant relationship between these same factors and client outcome. Furthermore, one study revealed that men fare better in

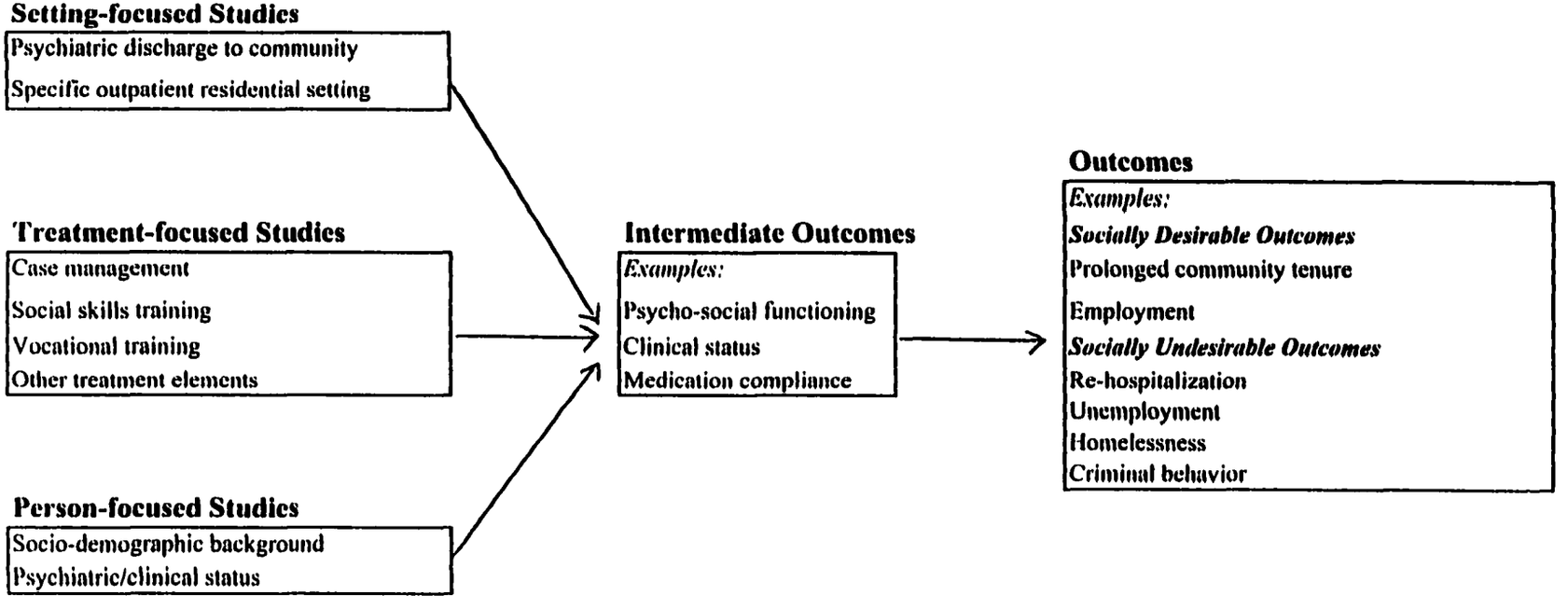
Table 1.1 Literature Review: Outcome Studies of Persons with Serious Mental Illness			
Author(s)	**Year**	**N**	**Study Design**
Setting-focused studies			
Psychiatric discharge to community			
Affleck JW Burns J Forrest AD	1976	75	Quasi-experimental: Pre-post test
Bland RC Orn H	1979	43	Quasi-experimental: Pre-post test
Bland RC Orn H.	1978	43	Quasi-experimental: Pre-post test
Capodanno AE Targum MA Unger S	1986	60	Quasi-experimental: Pre-post test
Carpenter WT Jr Strauss JS	1991	40	Quasi-experimental: Pre-post test
Caton CL	1982	119	Quasi-experimental: Pre-post test
Clum GA	1978	79	Quasi-experimental: Pre-post test
Coryell W Endicott J Andreasen et al	1988	469	Quasi-experimental: Pre-post test
de Jong A Giel R Slooff CJ et al	1985	73	Quasi-experimental: Pre-post test
Endicott J Cohen J Nee J Fleiss et al	1979	175	Non-experimental: Retrospective review
Franklin JL Kittredge L Thrasher et al	1975	107	Quasi-experimental: Pre-post test
Gift TE Strauss JS Kokes RF et al	1980	185	Quasi-experimental: Pre-post test
Glick ID Hargreaves WA Drues J et al	1976a	67	Quasi-experimental: Pre-post test
Glick ID Hargreaves WA Drues J et al	1976b	132	Quasi-experimental: Pre-post test
Grob MC Eisen SV	1989	376	Quasi-experimental: Pre-post test
Grob MC Eisen SV Berman JS	1978	712	Quasi-experimental: Pre-post test
Grossman LS Harrow M Fudala J et al	1984	167	Quasi-experimental: Pre-post test
Grossman LS Harrow M Sands JR	1986	47	Quasi-experimental: Pre-post test
Haas GL Glick ID Clarkin JF et al	1990	92	Quasi-experimental: Pre-post test
Harder DW Strauss JS Greenwald et al	1990	145	Quasi-experimental: Pre-post test
Hargreaves WA Glick ID Drues J et al	1977	119	Quasi-experimental: Pre-post test
Harrow M Grinker RR Sr et al	1978	132	Quasi-experimental: Pre-post test
Herz MI Endicott J Gibbon M	1979	175	Experimental: RCT
Herz MI Endicott J Spitzer RL	1977	175	Quasi-experimental: Pre-post test
Huber G Gross G Schuttler R Linz M	1980	502	Quasi-experimental: Pre-post test
Keitner GI Ryan CE Miller IW et al	1991	78	Quasi-experimental: Pre-post test
Keller MB Lavori PW Endicott J et al	1983	133	Quasi-experimental: Pre-post test
Kettering RL Harrow M Grossman et al	1987	110	Quasi-experimental: Pre-post test
Leff J Sartorius N Jablensky A et al	1992	807	Quasi-experimental: Pre-post test
Levenson AJ Lord CJ Sermas C et al	1977	20	Experimental: RCT
Lo WH Lo T	1977	82	Quasi-experimental: Pre-post test
Mattes JA Rosen B Klein DF et al	1977	105	Quasi-experimental: Pre-post test
May PR Tuma AH Yale C et al	1976	228	Quasi-experimental: Pre-post test
McGlashan TH	1984	226	Quasi-experimental: Pre-post test
McGlashan TH	1986	288	Quasi-experimental: Pre-post test
Moller HJ von Zerssen D et al	1982	103	Quasi-experimental: Pre-post test
Moos R Schwarz J	1972	292	Quasi-experimental: Pre-post test
Mosher LR Menn AZ	1978	63	Experimental: RCT
Munk-Jorgensen P Mortensen P et al	1991	53	Non-experimental: Retrospective review
Munley PH Hyer LA	1978	175	Non-experimental: Retrospective review
Plakun EM Burkhardt PE Muller J et al	1985	237	Non-experimental: Retrospective review
Polak PR Kirby MW	1976	75	Experimental: RCT
Pope HG Jr Jonas JM Hudson J et al	1983	27	Non-experimental: Retrospective review

Author(s)	Year	N	Study Design
Rabiner CJ Wegner JT Kane JM	1986	64	Quasi-experimental: Pre-post test
Singer JE Grob MC	1975	76	Non-experimental: Retrospective review
Stein LI Test MA	1980	116	Experimental: RCT
Stephens JH McHugh PR	1991	1003	Non-experimental: Retrospective review
Tsuang MT Woolson RF Fleming JA	1979	685	Non-experimental: Retrospective review
Vaillant GE	1978	51	Non-experimental: Retrospective review
Watt DC Szulecka TK	1979	282	Non-experimental: Retrospective review
Specific Outpatient Residential Setting			
Brook BD	1973	98	Experimental: RCT
Lehman AF Kernan E DeForge BR et al	1995	252	Non-experimental: Group comparison
Newman SJ Reschovsky JD et al	1994	1028	Quasi-experimental: Pre-post test
Srebnik D Livingston J Gordon L et al	1995	115	Non-experimental: Cross-sectional survey
Treatment-focused Studies			
Case Management			
Aberg-Wistedt Cressell Lidberg et al	1995	40	Experimental: RCT
Bigelow DA Young DJ	1991	42	Non-experimental: Group comparison
Bond GR Pensec M Dietzen L	1991	31	Non-experimental: Group comparison
Bond GR Witheridge TF Dincin J	1990	82	Experimental: RCT
Bond GR	1984	30	Quasi-experimental: Pre-post test
Bond GR Miller LD Krumwied RD et al	1988	167	Experimental: RCT
Borland A McRae J Lycan C	1989	72	Quasi-experimental: Pre-post test
Bush CT Langford MW Rosen P et al	1990	28	Experimental: RCT
Cutler DL Tatum E Shore JH	1987	30	Non-experimental: Group comparison
Dietzen LL Bond GR	1993	155	Non-experimental: Study combination
Dincin J WitheridgeTF Wasmer D	1993	66	Quasi-experimental: Pre-post test
Franklin JL Solovitz B Mason M et al	1987	264	Experimental: RCT
Goering PN Wasylenki DA Farkas et al	1988	164	Quasi-experimental: Matched groups
Hoult J Reynolds I et al	1981	120	Experimental: RCT
Hoult J Reynolds I et al	1983	120	Experimental: RCT
Jerrell	1995	122	Non-experimental: Group comparison
Jerrell JM Hu TW	1989	35	Experimental: RCT
Lafave HG deSouza HR Gerber GJ et al	1996	110	Experimental: RCT
Lehman AF Postrado LT Roth D et al	1994	661	Quasi-experimental: Two cohorts
Marx AJ Test MA Stein LI	1973	105	Experimental: RCT
McRae J Higgins M Lycan C et al	1990	72	Quasi-experimental: Pre-post test
Modrcin M Rapp CA Poertner J	1988	44	Experimental: RCT
Muller J	1981	66	Quasi-experimental: Pre-post test
Rife JC First RJ Greenlee RW et al	1991	176	Pre-experimental: Pre-post test design
Test MA Knoedler MA Allness DJ	1985	86	Experimental: RCT
Test MA Stein LI	1980	130	Experimental: RCT
Wright RG Heiman JR Shupe J et al	1989	196	Non-experimental: Statistical control
Social Skills Training			
Bellack AS Turner SM Hersen M et al	1984	64	Experimental: RCT
DeSisto MJ Harding CM et al	1995	269	Quasi-experimental: Pre-post test
Frisch MB Elliott CH Atsaides JP et al	1982	32	Experimental: RCT
Harding CM Brooks GW et al	1987	262	Quasi-experimental: Pre-post test
Hersen M Kazdin AE Bellack AS et al	1979	50	Experimental: RCT
Monti PM Curran JP Corriveau DP et al	1980	46	Experimental: RCT

Author(s)	Year	N	Study Design
Monti PM Fink E Norman W et al	1979	30	Experimental: RCT
Percell LP Berwick PT Biegel	1974	24	Experimental: RCT
Setze PJ Bond GR	1985	400	Non-experimental: Retrospective review
Stein LI Test MA Marx AJ	1975	120	Experimental: RCT
Social Skills with Vocational Training			
Beard JH Pitt RB Fisher SH Goetzel et al	1963	352	Experimental: RCT
Bond GR Dincin J	1986	125	Experimental: RCT
Dincin J Witheridge TF	1982	93	Experimental: RCT
Kline MN Hoisington V	1981	20	Experimental: RCT
Wolkon GH Karmen M Tanaka HT	1971	315	Experimental: RCT
Vocational Training			
Anthony WA Rogers ES Cohen M et al	1995	275	Quasi-experimental: Pre-post test
Azrin NH Philip RA	1980	25	Experimental: RCT
Bell MD Lysaker PH	1995	61	Quasi-experimental: Pre-post test
Bell MD Milstein RM Lysaker PH	1993	100	Experimental: RCT
Briggs PF Yater AC	1966	134	Experimental: RCT
Drake RE Becker DR Biesanz JC et al	1996	112	Quasi-experimental: Pre-post test
Griffiths RD	1974	28	Experimental: RCT
Kuldau JM Dirks SJ	1977	89	Experimental: RCT
Meltzoff J Blumenthal RL	1966	69	Experimental: RCT
Purvis SA Miskimins RW	1970	149	Experimental: RCT
Walker R Winick W Frost ES	1969	28	Experimental: RCT
Weinberg JL Lustig P	1968	38	Experimental: RCT
Other Treatment Elements			
Collins JF Ellsworth RB Casey et al	1985	7971	Quasi-experimental: Pre-post test
Warren R	1994	133	Non-experimental: Retrospective review
Treatment x Setting-focused studies			
Home Care Services			
Audini B Marks IM Lawrence RE et al	1994	136	Experimental: RCT
Fenton FR Tessier L Struening EL	1979	155	Experimental: RCT
Marks IM Conolly J Muijen M et al	1994	189	Experimental: RCT
Muijen M Marks IM Conolly J et al	1992	189	Experimental: RCT
Simpson CJ Seager CP Robertson JA	1993	189	Experimental: RCT
Specific Outpatient Residential Setting with Vocational Training			
Fairweather GW Sanders DH et al	1969	150	Experimental: RCT
Lamb HR Goertzel V	1972	91	Experimental: RCT
Paquett A Lafave H	1964	280	Experimental: RCT
Velasquez JS McCubbin HI	1980	72	Experimental: RCT
Person-focused studies			
Bigelow DA McFarland BH et al	1991	190	Quasi-experimental: Pre-post test
Carone BJ Harrow M Westmeyer J et al	1991	79	Quasi-experimental: Pre-post test
Childers SE Harding CM	1990	82	Non-experimental: Retrospective review
Cook JA	1994	650	Non-experimental: Cross-sectional survey
Dewees M Pulice R McCormick L	1996	46	Quasi-experimental: Pre-post test
Goethe JW Dornelas EA Fischer EH	1996	350	Quasi-experimental: Pre-post test
Harder DW Greenwald DF Strauss et al	1990	77	Quasi-experimental: Pre-post test
Lafave HG deSouza HR Prince PN et al	1995	54	Experimental: RCT

Author(s)	Year	N	Study Design
Lehman AF Slaughter JG Myers C et al	1992	469	Non-experimental: Cross-sectional survey
Postrado LT Lehman AF	1995	559	Non-experimental: Study combination
Rimmerman A Finn H Schnee J et al	1991	617	Non-experimental: Group comparison
Uehara ES	1994	517	Non-experimental: Retrospective review
Wykes T	1994	49	Quasi-experimental: Pre-post test

Figure 1.1 Literature Review: Organizational Framework of Outcome Studies of Persons with Serious Mental Illness



short-term compared to long-term hospitalization than women[72].

In most of these studies a significant relationship was discovered between individual-level attributes and client outcomes. In general, while these studies have implicitly focused on client outcomes in a community setting, few attempted to operationalize community context or setting by the inclusion of variables at this level. Furthermore, most of these studies used a pre-post test design, excluding the use of a control group for comparative purposes. Although we have a sense of change in individuals over time, we have no way to determine if these same changes would occur in alternative settings, either for inpatients or outpatients. We are left with a set of studies that tells us something about individual contributions to outcomes, but very little about the effect of treatment setting on outcomes. In order to change treatment strategies to improve client outcomes, we must know something about treatment effects on outcomes, as well as characteristics and behaviors of individuals. Another set of studies investigates this link.

Treatment-focused Studies

Individuals with SMI possess functional and psycho-social deficits. Psycho-social rehabilitative and supportive services -- including case management, social skills training, and vocational instruction -- are designed to help the client re-integrate into a community setting. Another set of treatment-focused studies investigates the relationship between clients having received these services and client outcomes.

Case Management

A variety of empirical studies have suggested that case management services may improve quality of life.[73,74,75,76] Case management services for the chronically mentally ill aim to assist the individual in adjusting to community living.[77] Case management can be viewed as a "vehicle for implementing continuity in the care of mentally ill persons."[78]

A recent review article synthesized findings related to the impact of case management on quality of life. Overall, most studies revealed that case management services improve quality of life.[79,80,81,82,83,84] Additionally, case management results in a decrease in re-hospitalization and in the event of hospitalization, a decrease in length of stay for clients receiving this service.[85] However, other studies showed no discernible effect of case management on quality of life.[86,87,88] These studies tended to include a shorter study period, suggesting the need for longer time frames when investigating quality of life in order to demonstrate any discernible effect of case management.[89]

As an example, Goering et al's study included one of the longer time frames, 24-months[90]. In this study, a group of case managed clients were compared to a matched control group without case management at several time points over the 24-month period. Although there were no differences between the groups in terms of rehospitalizations, the case managed group did improve both in their occupational functioning and their residential independence and stability. This study suggests that rates of rehospitalization may not be wholly comparable to residential stability. Clients may benefit from short

intermittent stays in an inpatient setting, while retaining primary residence in the community setting.

Case management may result in "improved targeting of interventions and services" which would then lead to increased use of appropriate resources (housing, social skills training, job placements) by individuals. Often, the time of discharge to a community setting and the subsequent re-entry into the workforce and/or family environment represents a vulnerable time, requiring additional supports such as case management.[91] Persons may benefit from the coordinating role that a case manager can fill. Additionally, this sort of facilitation may lead to a more appropriate use of mental health and social resources.

Case management also may result in clients experiencing increased outside attention regarding their needs, thus, reducing the degree of social isolation they feel. One study specifically found that the size of the clients' social networks increased for clients in a case management group and decreased for the comparison group clients who did not receive case management services.[92] Additionally, case management resulted in a decreased care burden for family members. Although quality of life improved in both the case management and control group, it improved to a greater extent in the case management group in that study.[93]

Not only do definitions of the purpose of case management vary, but so do the services themselves across programs.[94,95,96,97,98] For example, case management services

can be provided by a single social worker or by a multi-disciplinary team. Caseloads can range from one case manager for every eight clients to above 50 clients per case manager. Case management services might include service brokerage activities, for example gaining access to housing and employment resources on behalf of the client. Case management services can also include more therapeutic and educationally oriented services with a central treatment focus than simply service brokerage activities. Clearly, there is tremendous variability among treatment programs in terms of the type of case management provided.

The actual content of case management services that are delivered is often wholly different from the intent of the treatment program.[99] This ambiguity makes it difficult to judge the effectiveness of case management services from descriptions of case management service alone. However, the continuity of contact, whether case management is provided or not, relates positively and significantly to improved outcomes across a variety of case management strategies. For example, a minimum intensity of case management service may be necessary to reduce hospital use among clients with SMI.[100,101,102] This suggests that an opportunity for ongoing contact with another person may be beneficial irrespective of the content of the specific case management program. Therefore, even without knowing much about the type of case management provided at a given site, one can determine whether case management exposure affects quality of life.

Overall, there is considerable evidence that case management is positively related to a decrease in re-hospitalization and an improvement in quality of life. However, many

of these studies focused on particular sub-populations, such as those with a high risk of rehospitalization. Perhaps case management exhibits a strong positive effect on a high-risk population but a diminished or opposite effect for a different population group. Many studies neglected to test the relative impact of case management on client outcomes across a broader group of clients with SMI.

Social skills and vocational training

In addition to case management services, other aspects of treatment programs, including training in psycho-social and vocational skills, have demonstrated positive effects on mental health outcomes. For example, social skills and vocational training results in improved psychiatric status, global functioning, and employability[103.104.105.106.107]. Although one study found that persons who became employed had lower symptom scores than those who remained unemployed, it may be that an increase in self-esteem associated with vocational training rather than a decrease in symptoms resulted in increased employability.[108] It should be noted that many studies revealed a drop-off in employment differences between non-vocationally trained and vocationally-trained groups upon program termination[109.110]. Most significant positive differences between groups in employment status were obtained early in the study (within 12 months). Little is known about the reasons for this drop-off effect, as none of these studies focused explicitly on the effect of job availability in the community over time, nor on the concurrent effect of vocational training on client employability and employment.

Other treatment elements

Several studies have attempted to measure the impact of the treatment environment on client outcomes. One study investigated specifically the effects of social-structural elements of the treatment environment on the community tenure of persons with schizophrenia who were enrolled in different mental health treatment programs.[111] Client and staff perceptions of the program's practical orientation and degree of staff control related most strongly to improved community tenure. Here, the degree of structure provided by the programs (especially those with a high degree of practical orientation and staff control) was positively related to community tenure. However, the authors acknowledge that the potential for interaction between individual attributes and treatment environment characteristics was not tested.

Advocates of community mental health care, in particular the psycho-social rehabilitation approach, maintain that "the essential starting point for a proper understanding of rehabilitation is that it is concerned with the individual person in the context of the environment."[112] Model outpatient treatment programs that are oriented toward the tenets of psycho-social rehabilitation tend to offer their clients access to social contacts, structured activities, and supervision and guidance.[113] The treatment program's orientation, including the degree of structure provided and assistance offered, helps to moderate the demands that society places on the deinstitutionalized client as he or she re-integrates into a community setting. Clearly, both individual and environmental factors determine whether the discharged individual will be able to remain and thrive in a community setting. However, few studies have attempted to operationalize and test the concurrent effects of individual and environmental influences on client outcomes.

Treatment x Setting-focused Studies

A few studies focused on the concurrent effect of treatment services and setting on client outcome. Five studies investigated the effect of home care services on such outcome measures as client satisfaction, social adjustment, inpatient days, and rehospitalization.[114,115,116,117,118] The results are mixed; some studies revealed no effect or a diminishing effect of home care over time on client outcomes. However, most studies did show that mental health home care has a positive effect on social adjustment and decreased re-hospitalizations. Another set of studies investigated the effect of vocational training within the context of a particular treatment setting.[119,120] Again, as with the broader group of studies that focused on vocational training, here again they reported a drop-off effect over time. Although a marginal difference in employability is obtained between treatment groups, this effect drops off over time, leaving little to no difference in the effect of vocational training on employability. Relatively few studies have attempted to assess the concurrent effects of treatment and setting on client outcomes.

Person-focused Studies

Another group of person-focused studies investigated, rather exclusively, the effect of individual-level attributes on client outcome. Most of these studies included two broad categories of predictor variables: socio-demographic background and psychiatric/clinical status. The socio-demographic background variables include gender, race, age, marital status, education level and occupation. The psychiatric/clinical status variables include diagnosis, history of psychiatric institutionalization and clinical functional status. Overall, only one of these variables, diagnostic category, revealed a

significant relationship with psychiatric rehospitalization. Persons with schizophrenia tended to have higher rates of rehospitalization than persons with a non-schizophrenic diagnosis of SMI.[121] Controlling for clinical, behavioral, economic and ecological factors, one study found significant effects of race and gender on the odds of experiencing low quality housing.[122] There is some evidence that psycho-social functioning may be strongly associated with long-term outcome.[123,124] On the whole, the evidence for individual level attributes influencing client outcomes is inconsistent. This is likely to result from the variable population groups, treatment settings, and contextual environments included in these studies. Researchers should pay more attention to treatment setting variability related to client composition and organizational context.

Limitations of Studies

A review of the literature on mental health service outcomes for persons with serious mental illness over the past three decades suggests several conclusions for improvement of future outcomes studies. Outcome studies of persons with SMI residing in the community suffer from one or more of the following limitations: (1) lack of a multi-dimensional outcome measure, (2) small sample size, (3) short time frame, (4) non-rigorous research design or analytic technique, or (5) unexamined interaction between individual and treatment environment.

Future studies should incorporate well-defined and multi-dimensional outcome measures. Researchers should provide clear descriptions of successful outcomes and assess them from multiple perspectives and in multiple domains. For example,

rehospitalization rates may not indicate a poor outcome if the client maintains a reasonable quality of life, overall level of independence, and residential stability in the community. In other words, assessing only readmission to a psychiatric hospitalization may ignore the potential benefit of short stays in a psychiatric facility for clients with SMI who reside primarily in a community setting.

Sample size also contributes importantly to the quality of the research results, particularly in this client population. As the sample size increases, the reliability of the results becomes stronger assuming a representative sample in relation to the overall population. When studying persons with SMI, there typically is a higher rate of sample attrition over time.[125] This population is often mobile and difficult to engage. In addition, many refuse to continue participating or refuse and/or are unable to complete particular survey questions, making the survey instruments for these individuals unavailable or unusable. Furthermore, many individuals cannot be located at all. Investigators need to understand that loss of study sample will occur and plan appropriately at the study design stage by starting with very large samples. Appropriate follow-up procedures should be in place at the study implementation stage in order to boost the retention rate of study participants. Longer study time frames are also needed to capture change in outcome indicators, particularly for clients with chronic conditions.

In addition, studies should acknowledge that treatment regimens vary across individuals and across programs. Often, it is not feasible to employ randomized controlled strategies when assessing the benefits of one treatment strategy or setting over

another. Rather than withhold needed treatment, researchers often use quasi-experimental control designs to address the lack of randomization issue. Here, the aim is to control for patient selection into certain types of programs based on salient client characteristics. Researchers can design matched control groups based on salient characteristics from study initiation and/or utilize appropriate statistical methods at the analytic stage to control for patient selection into certain programs. Powerful statistical techniques are available to control for the unique composition of treatment programs. These techniques allow the investigation of outcome variance across individual clients and across treatment programs, controlling for program composition.

Equally important is the investigation of the interplay between clients and their treatment environments and how this interaction affects the outcome investigated. Studies have tended to avoid the use of powerful statistical techniques.[126,127] In order to adequately address the issue of person by environment interaction more rigorous methodologies should be used. Different treatment contexts and strategies likely have variable effects on different individuals. Researchers should pay more attention to variable population groups, treatment settings, and contextual environments. Appropriate methods are available for addressing variability at more than one level of data and effects across levels of data.

Summary

I have tried to describe the state of published research on mental health outcomes on persons with serious mental illness during the post-institutional era. I suggest that the

study described in this dissertation improves upon past research by addressing several areas of limitation in the extant literature. This study investigates a multi-dimensional outcome measure, and utilizes a large sample of SMI clients over a substantial time frame. In addition, it employs a multilevel analytic framework which allows the investigation of an interaction between individuals and their treatment environments.

ORGANIZATION OF THE STUDY

Following this introductory chapter, Chapter II describes the conceptual framework adopted in this study, in particular the multidimensional nature of quality of life and the concept of "fitness". In Chapter III, I describe the methods used and the analytical plan. Chapter IV presents the descriptive results, and Chapter V the analytic results. Chapter VI discusses these results in the context of the theory presented and summarizes study findings, limitations, and potential uses for future research.

CHAPTER II

QUALITY OF LIFE: A CONCEPTUAL FRAMEWORK

In order to investigate the quality of life of the U.S. veteran with serious mental illness, this study uses an ecological framework to explore the meaning of social integration and well-being for the person with serious mental illness. This involves investigating the nature of contemporary mental health service delivery and the dependent variable of interest in this study: the quality of life of veterans with SMI. An ecological framework provides a foundation for investigating the interaction between characteristics of persons and their treatment environment. The environment of interest here includes different treatment program orientations toward structured support and the provision of case management services. I investigate the impact of these social structural effects on the quality of life of the individual with SMI in a community living environment. To begin, I provide a review of the concepts of social integration and well-being followed by a discussion of the ecological perspective.

QUALITY OF LIFE: A MULTI-DIMENSIONAL CONCEPT

Quality of Life as an Important and Relevant Outcome

The importance of this particular study is echoed in a recent review of the application of medical sociology to the study of serious mental illness. Although there has been a considerable amount of social-epidemiological investigation of SMI over the past twenty years, there has not been a sustained effort at elaborating "the current social conditions of those with mental illness and the social aspects of the current community

treatment system."[128] What is needed, in addition to the social epidemiological investigation of SMI, is a thorough attempt to understand the social conditions of the deinstitutionalized person with SMI and how mental health services and other interventions can better his/her quality of life.

This study focuses on quality of life outcome measures rather than the more traditional clinical indicators that measure symptomatology and psychobiological functioning. Such issues as access to resources and opportunities, family and social relations, and overall degree of well-being may be as important for community tenure as clinical functioning.[129,130] A number of studies show that improved living skills, better social functioning and enhanced quality of life are associated with decreased recidivism.[131,132,133,134] For example, there is considerable evidence that good social support lessens psychological distress, which may lead to an enhanced ability to remain in a community setting.[135,136] The stress-buffering hypothesis of social support maintains that the availability of social support can lessen the psychological impact of stressful experiences and events.[137] In the case of persons with mental illness, the stressful stimuli could be discharge into a community setting and the day-to-day rigor of social adjustment. Social support -- emotional, informational and instrumental -- can help the discharged individual cope with a variety of stressors in their social environment.[138] Emotional support can be provided by friends, family members and health care workers. Health care workers are particularly helpful in providing informational and instrumental support such as helping the person with SMI acquire job skills and facilitating placement in a sheltered workshop environment. Acquiring social and instrumental skills, and being able to use these skills, are essential components of community adjustment and an enhanced quality of life.

Quality of life is a particularly relevant concern in the post-institutional era for at least two reasons: (1) it is an implicit goal of outpatient mental health service provision and (2) it has displayed a positive relationship with community tenure.[139] The expansion of mental health services into outpatient venues that incorporate social and rehabilitative services calls for broader-based evaluations focused on the overall well-being of the individual with serious mental illness, not simply their clinical functioning.[140] Furthermore, unless a person both perceives and experiences an enhanced quality of life in the community, the risk of re-institutionalization remains high.[141,142]

Quality of Life Defined

Quality of life is broadly defined in terms of "adequate access to resources, fulfillment of social roles in multiple life domains, satisfaction with life in various domains, and general life satisfaction."[143] Quality of life indicates the degree of individual participation in the community and the client's sense of well-being in a variety of life domains.[144] Quality of life comprises two distinct dimensions: objective and subjective. Objective aspects of quality of life connote the degree of community adjustment or social integration achieved by the individual. For example, the objective dimension would incorporate individual participation in the community including employment status, relations with friends and relatives, degree of financial security, and overall safety, in addition to characteristics of the client's living situation. The subjective dimension of quality of life incorporates the client's own perception of well-being or satisfaction in several life domains. There may or may not be correspondence between the objective and subjective dimensions of quality of life, just as each domain area (e.g. social relations and living situation) may exhibit significantly different degrees of community adjustment or well-being.

The objective dimension of quality of life corresponds most directly to societal expectations about psychiatric deinstitutionalization. Much activity in the mental health service sector is rooted in the idea that mentally ill individuals can be re-integrated into mainstream society. "Community care policies aim to integrate people with schizophrenia into the community rather than segregate them from it."[145] This integration is expected to occur along several dimensions related to employment, residential status and economic independence. Full social integration, also labeled community adjustment, is often termed "self-sufficiency". This translates to full-time competitive employment, and residential and economic independence. The goal for the client with serious mental illness may not be complete self-sufficiency. Providers seek to improve the functional capacity of the client to take care of a variety of his or her own daily needs such as cooking and cleaning and to interact with others in a socially acceptable manner. Society has used institutionalization as a mechanism for separating from the rest of society individuals who are unable to function in a socially acceptable. In order to avoid re-institutionalization, there must be adequate supports in the community to sustain the socially acceptable behavior and further the process of social integration. Although, complete social integration (full residential and economic independence) is unlikely, partial integration is very possible.[146]

With a focus on policies of inclusion and community living, rather than exclusion and institutionalization, society directs its efforts on providing supports that will enhance client functioning.[147] Mental health and other services are provided to improve the client's community living skills and psycho-social functioning. For example, case management is conceptualized as a social support mechanism. There is a strong belief among mental health service providers that case management can provide a necessary coordinating function to support the mentally ill client in accessing resources in order to live in a community setting. The more an individual is socially adjusted to their

environment the greater their chances at improving their overall quality of life (objectively and subjectively). This social adjustment is facilitated by treatment program staff who assist clients in acquiring coping and social skills necessary to maintain an adequate level of community adjustment and personal well-being.[148]

Evaluating Quality of Life

Bigelow, McFarland and Olson set forth a quality of life theory which states that quality of life is based on fulfilling needs, meeting social expectations and accessing opportunities by using one's abilities.[149] In the case of persons with mental illness, these abilities are impaired. Socially unacceptable behaviors, somatic and basic living skill deficits make it difficult for the person with serious mental illness to obtain work, interact socially and avoid re-hospitalization.[150] Marx, Test and Stein identify three characteristics of persons with serious mental illness that make successful community treatment problematic:[151]

(1) "A limited repertoire of instrumental and problem-solving behaviors to meet the goals and demands of life. These deficits lead to difficulties not only in handling stress, but also with work habits, socialization and leisure time activities.

(2) Powerful dependency needs, frequently expressed as an aggressive dependency on family or institutions, and often present for most of these individuals' lives.

(3) A capacity to develop severe psychiatric symptomatology when confronted with only mild to moderate degrees of stress".

Despite optimistic reports of remission in a small subsample of schizophrenics, many will likely continue to experience major difficulties in social adjustment and poor overall levels of functioning either chronically or intermittently throughout their lives.[152]

Eventhough a person may improve markedly in their psycho-social functioning at any given time, their previous work record and social history follows them, making future employment opportunities and social relationships a bit tenuous. Early studies of serious mental illness noted that universal statements about outcome ought to be refined to address specific variables representing specific functional areas.[153] Rehabilitative and treatment programs have the capacity to improve psycho-social functioning, daily living skills and other areas of function which affect community adjustment. These issues, social adjustment and psycho-social functioning, represent areas of prime importance for clinicians and policy-makers to address.

Rehabilitation programs are oriented toward "patients acquiring coping skills necessary to live in the community and enjoy a reasonable quality of life".[154] As such, mental health services are designed to moderate the demands of society, supplement opportunities available to the person with mental illness and improve psycho-social abilities. In providing these services, society hopes to reduce costs related to institutional care and improve the client's overall quality of life. A recent study of persons with SMI discharged into structured community residential centers found that significant improvement in social and cognitive functioning occurred even for clients with low levels of these functional areas when in the hospital setting.[155] This study also found a consistent improvement in perceptions of quality of life among discharged clients even after taking into account their previous institutional history and clinical profile. Finally, as client's quality of life improves, so does his/her ability to remain in a community setting.[156,157]

There are a variety of ways to measure the multidimensional concept quality of life. However, several difficulties must be acknowledged when analyzing quality of life. There may be a mismatch between the domains of quality of life assessed and the aim of

the treatment program.[158] Research on outcomes implies accountability of the treatment provider. Rather than view outcomes research as exclusively a method of program evaluation, it may be more useful to assess the independent effects of treatment strategies and setting on three important elements of quality of life: 1) functional status, 2) resource and opportunity access and 3) a sense of well-being. Furthermore, a description of client goals reveals that rather than "obtain community services" clients' goals include "a decent place to live, a satisfying job, a chance to return to school, friendships and alleviation of psychological distress."[159] Therefore, this study recognizes quality of life as a multi-dimensional concept which includes both objective (social integration) and subjective (well-being) dimensions as well as various life domains (e.g. family, finances and housing).

QUALITY OF LIFE AS FIT: AN ECOLOGICAL FRAMEWORK

An ecological perspective provides an orienting framework for understanding the process of community adjustment and the meaning of quality of life for the person with SMI. Goodhart and Zautra apply an ecological approach to investigating quality of life at the community level.[160] Although their perspective is broadened to focus on the larger issue of global community mental health, their theoretical orientation has particular application to the problem addressed in this study; namely the quality of life of the individual with serious mental illness. They set forth three assumptions that apply equally well to measuring quality of life at the individual level: (1) The effects of person and environment act simultaneously and never in isolation from each other, (2) Quality of life can be defined as a product of the "fit" between the person and his/her environment and (3) "Fitness" connotes a variety of program alternatives, not one best setting or

program. "Fit" is defined as the amount of consonance between individual needs and abilities and environmental demands and opportunities.

An ecological analysis focuses on the contingent nature of social phenomena and "patterns of congruence between personal needs and the environment rather than characteristics of either alone".[161] Kurt Lewin captured the essence of ecological theory in the equation B=f(P,E) whereby behavior is a function of the interaction between a person and their environment.[162] The core idea is one of "optimal fit." An exclusive focus on the person-side of the person-environment fit equation would focus on increasing individual capacities or changing qualities of the person without regard to environmental contingencies. An exclusive focus on the environment side of the person-environment fit equation would focus exclusively on treatment program characteristics without regard to variable individual capacities. Ecological theory recognizes that the interaction between characteristics of the environment and characteristics of the individual ultimately determine outcome.[163,164]

Bridging Levels of Analysis

An ecological analysis specifically recognizes the "mutual interrelations (or interactions) between micro and macro levels" of social phenomena.[165] Micro-level phenomena include characteristics such as personality, skills levels and qualities that the individual brings to a situation whereas macro-level phenomena includes environmental and social structural characteristics outside the individual. Numerous sociological theorists have attempted to bridge the micro and macro levels of social analysis.[166,167,168,169,170] A specific focus on an ecological perspective advances the possibility of bridging micro and macro-level phenomena by incorporating the notion of interactions between the two levels.[171,172] An interactional perspective necessarily calls attention to the goodness of fit between characteristics of the individual and his or her

environment.[173,174] If we begin with a bottom-up approach that starts with people and work backward to determine which programs or treatment settings are best as measured by chosen outcome indicators, we allow for different treatment strategies and settings for different people.[175]

The Concept of Fitness

In an ecological analysis, diversity of form rather than homogeneity of form dominates because of the incorporation of contingencies. A central question is by what standards is fitness to be judged? In this study, quality of life is an indicator of the degree of fit between the individual and their environment. Other researchers argue that measures of social integration and well-being, such as quality of life, can be used as a criterion for matching the fit of individuals with programs and communities.[176] A low score on the quality of life scale would indicate relatively poor fit between an individual and their treatment environment whereas a higher quality of life score would indicate better fit. This study will specifically address two dimensions of quality of life which measure individual social integration (objective dimension) and well-being (subjective dimension).

An Ecological Framework Applied

The scope of environmental factors to be studied relates to the researcher's particular interests. In this particular study, I am interested in treatment and program effects as social structural factors contributing to quality of life. Therefore, overall program orientation and provision of case management services represent relevant variables related to mental health service programming included in this study. I expect that programs have a certain amount of control over their service orientation and provision of case management services. I further expect that the provision of case management services or placement in a specific type of program will affect the ability of

an individual to use environmental resources to satisfy their own needs and wants. Case management will likely have a greater impact on highly vulnerable individuals than less vulnerable ones.[177] Specifically, individuals with certain types of characteristics such as a history of longer institutional stay, poorer functional status and/or a diagnosis of schizophrenia are expected to require greater supportive services in their transition from institutional dependence to community living.[178,179,180,181]

Accordingly, a program might offer an ideal context for one client but be detrimental for another. The key is in "the fit" of clients with their environment. Determining the best fit requires the use of more than simply diagnostic information to predict the potential of any given client with mental illness for rehabilitation and an improved quality of life.[182,183,184,185] Favorable outcomes will likely be based on environmental impacts such as availability of case management services and structured support among other factors.[186,187,188,189,190] These aspects of programs are expected to relate to the degree of community adjustment achieved by persons with serious mental illness. "Individual characteristics, in interaction with characteristics of specific facility and community types, have an important bearing on social integration".[191]

It may be that a particular set of individuals with similar attributes respond favorably in settings with a high degree of structure and this structure may, in turn, contribute to their length of stay in the community. In other words, different orientations of treatment programs may result in different outcomes depending on client characteristics and needs. For example, a day treatment center may not result in the most favorable outcome for persons with schizophrenia, but may provide an ideal psycho-social rehabilitation approach for non-schizophrenic clients.[192]

People with SMI may also respond differently to the separate components of case management depending on their own functional status and psycho-social attributes.[193] For example, direct help rather than advice seems to have the most significant effect on improving quality of life. For those individuals with severe disability, service brokerage alone may be less acceptable, resulting in a decrease in quality of life. This suggests that a low-key rehabilitation approach to case management may improve quality of life for individuals with specific psychiatric profiles. However, this low-key approach could also result in an increase of negative symptoms and low treatment compliance.

Indeed, the core definition of case management states that it involves assessing environments for appropriate fit and matching clients to "environments that will accommodate their individual demands and requirements."[194] Case management has been envisioned as the means by which a better fit can be achieved between a client's needs and the resources available to them in a community setting.[195] Although the research literature itself has not rigorously tested the notion of interaction between environmental and individual attributes on treatment outcomes, the community of mental health service providers appear to acknowledge this issue quite readily.[196] A multilevel and interactional model of mental illness is supported by professionals in the psychosocial treatment field, yet this theoretical framework has been underspecified in the vast majority of empirical work in this field. Outcomes research should be improved by acknowledging the importance of main and interactional effects of biological, environmental and behavioral factors across individuals and over time.[197,198]

In this study, the different treatment strategies (case management exposure) and settings (program orientation) constitute the elements of the treatment environment to be investigated. Individuals are expected to vary in their relative need for case management services. Some individuals will require greater assistance in accessing resources while others may need rather minimal support. Individuals require different types of and degrees of support in order to function effectively in a community living environment.[199] Likewise, treatment programs oriented toward providing structured support as opposed to looser drop-in arrangements will vary in their effectiveness based on client needs. By employing an ecological framework, I will investigate whether attributes of the client, of the treatment program or the interaction between these two levels possess any power in explaining individual quality of life.

MODEL AND HYPOTHESES

This section introduces the specific hypotheses to be tested as well as the overall analytic model. Figure 2.1 displays the hypothesized main and moderation effects on the dependent variable, quality of life. The hypothesized main effects (H1a-c, H2, H3 a and b) indicate the direct effects of the psychiatric profile variables (primary diagnosis, functioning, institutional stay) and the treatment environment variables (case management and program orientation) on quality of life. The hypothesized moderation effects (H4a-c and H5a-f) indicate the moderating effects of program orientation and case management on the relationships between the three psychiatric profile variables and quality of life. Each of these hypotheses will be described in detail below. In addition to the hypothesized effects, other salient covariates will be included in the overall analytic model.

Figure 2.1: Quality of Life of the U.S. Veteran with Serious Mental Illness
A Conceptual Model of the Hypothesized Effects

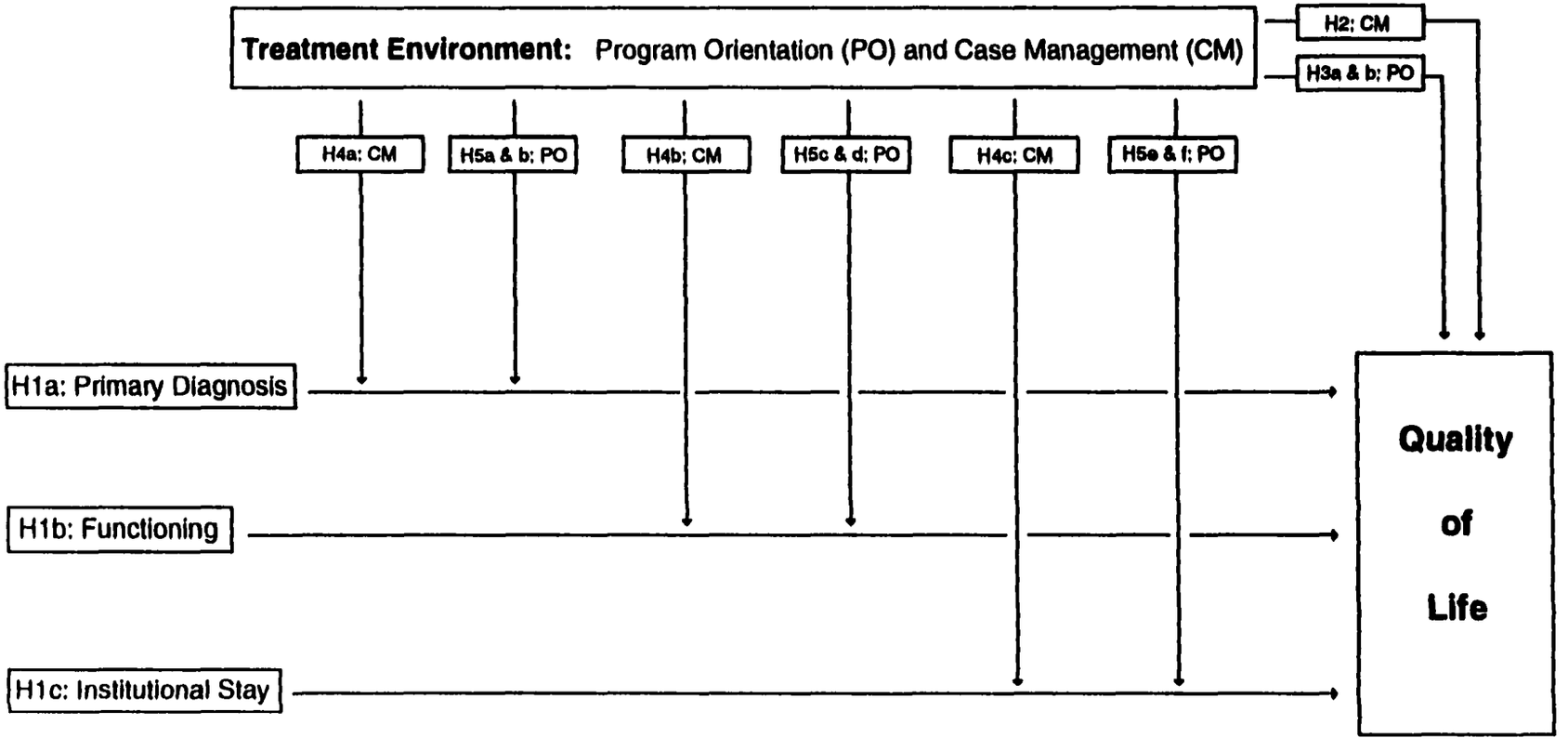


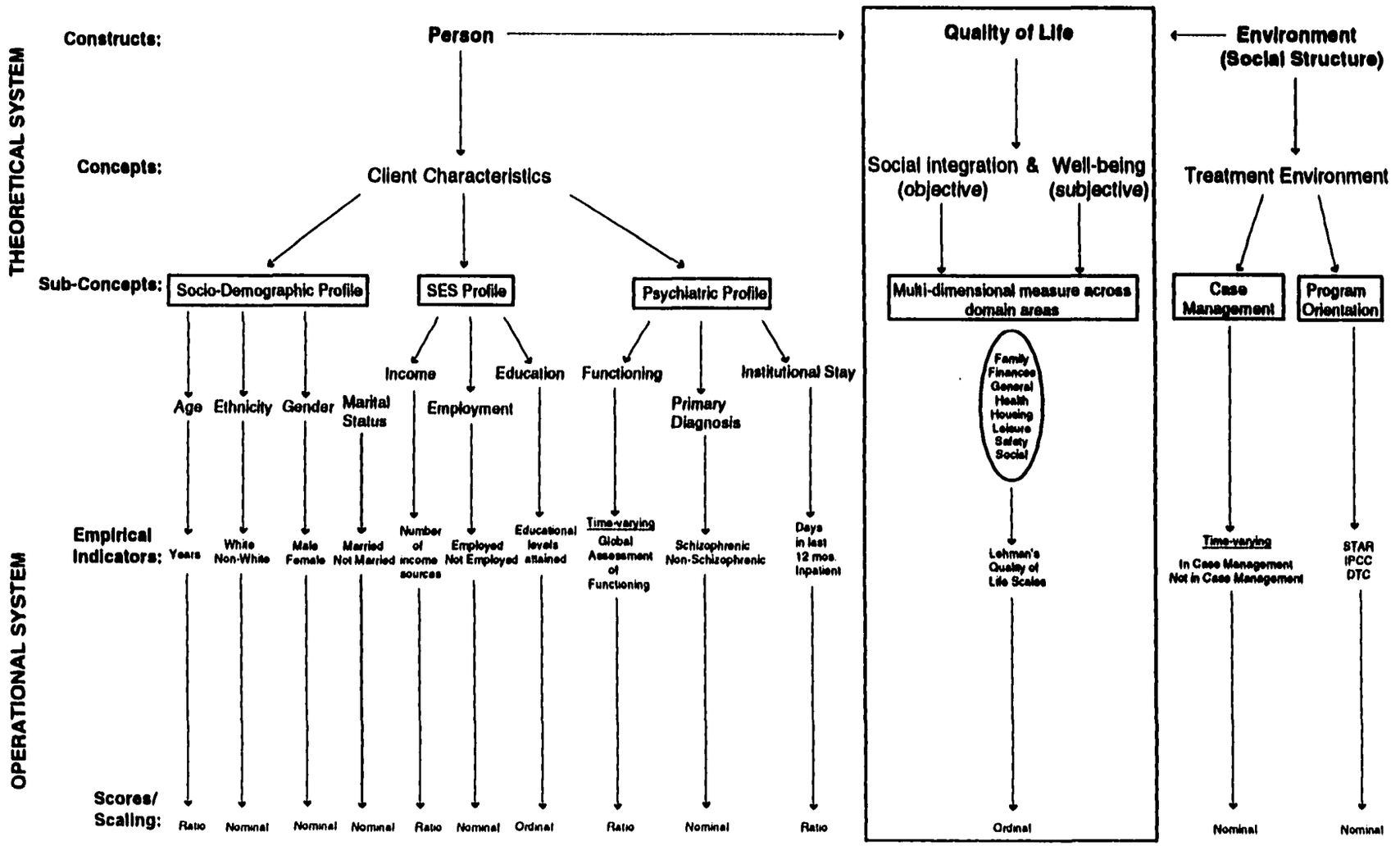
Figure 2.2 displays a substruction model[200] (a theory to measurement model) which relates the theoretical constructs to the empirical indicators employed in the analysis. This study is primarily concerned with the effects of structured support (treatment program orientation and case management) on quality of life. Treatment regimens vary across treatment programs and across clients in terms of the degree of structured support provided to the client. Some clients may receive treatment in highly structured inpatient rehabilitation programs and receive continuous case management services; the highest level of structured support offered. Likewise, clients may receive treatment in less structured day treatment centers and receive no case management services; the lowest level of structured support offered. Treatment regimens are expected to vary considerably across programs and clients in order to meet client needs. Individuals with greater psycho-social impairment and functional limitations are expected to benefit more from case management services and to fare better in programs that offer a higher degree of structured support. In other words, individuals with greater dysfunction will require more assistance in obtaining resources and building social skills in order to live in a community setting. What follows is a discussion of the controlled effects and the explicit hypotheses to be tested in relation to each of the five central research questions discussed previously.

Controlled Effects - *Client Characteristics*

Socio-Demographic Variables (Age, Ethnicity, Gender, Marital Status, SES Profile)

Numerous studies have examined the effects of socio-demographic variables on various mental health outcomes including individual well-being, the dependent variable of interest in this analysis.[201,202,203,204,205,206,207] Additionally, there is research evidence that some socio-demographic characteristics are related to other potential predictors of

Figure 2.2: Quality of Life of the U.S. Veteran with Serious Mental Illness
A Substruction Model: From Theory to Measurement



well-being. For example, schizophrenia has been shown to be at least five times higher in the lowest SES groups than the highest SES groups.[208,209] The causal order of this relationship has not been resolved and requires further research. Some hypothesize a "downward drift" theory whereby individuals with schizophrenia lower their socio-economic status over time while others posit a theory about the psychological properties of poverty contributing to the schizophrenic condition. Another important covariate is age as there is some evidence that as age increases, support needs increase. However, there is also some evidence that psychiatric symptoms flatten-out as a person ages. Although there is some prior evidence that age exhibits a non-linear effect on outcome in combination with other important covariates (social support and psychiatric symptomatology), its main effect should be considered as well. Consequently, age, gender, ethnicity, marital status and socioeconomic status will be included as control variables in this study.

Hypothesized Effects - *Client Characteristics*

Psychiatric Profile (Functioning, Primary Diagnosis, Institutional Stay)

Several studies have investigated the effects of symptomatology, daily living skills, and social functioning of persons with mental illness on outcome as measured by recidivism and community tenure. Less symptomatic clients and those with more skills in daily living and social functioning show greater tenure in a community setting. Furthermore, these same clinical and basic functioning measures are associated with well-being among persons with serious mental illness (SMI).[210] Clinical functioning, psychiatric diagnosis, and history of inpatient stay are salient dimensions related to well-being and social integration.[211] I am particularly interested in how an individual's baseline psychiatric profile is associated with his or her subsequent improvement in quality of life. This relates to my first research question; ***(1) How do different aspects of the client's psychiatric profile impact quality of life?***

Several researchers have investigated how psychiatric diagnoses and history of inpatient stay among persons with mental illness influence readmission patterns, community tenure, and general well-being.[212,213,214,215] Individuals with a history of longer stays in an inpatient setting tend to be readmitted faster or more often than those with shorter inpatient stays prior to community discharge. Serious and chronic mental illness impairs physical, psychological, and social functioning and greatly hampers the ability of those with SMI to maintain social relationships, obtain and/or retain a job, and live independently. Among the diagnostic categories included under SMI, schizophrenia is a particularly devastating illness. Clients with schizophrenia often show severe social functioning problems and greater difficulty remaining in a community setting compared to persons with a non-schizophrenic diagnosis of SMI (bipolar, mood and organic disorders).[216]

In general, individuals with a higher degree of impairment as indicated by psychiatric diagnosis, functional status and history of inpatient stay will have greater difficulty in obtaining resources, interacting socially and feeling satisfied across a variety of quality of life domain areas. Based on this premise, I propose the following hypotheses:

H1a: (Primary Diagnosis) Compared to individuals with a non-schizophrenic diagnosis, individuals with a schizophrenic diagnosis exhibit lower levels of quality of life.

H1b: (Functioning) As baseline functioning decreases, individuals exhibit lower levels of quality of life.

H1c: (Institutional Stay) As the number of days spent in a hospital prior to program entry (date of initial clinician's assessment) increases, individuals exhibit lower levels of quality of life.

Hypothesized Effects - *Social Structural Characteristics*

Social structural effects include program orientation and case management exposure. Program orientation is assumed to be a constant effect for everyone in the same program. Whereas, case management exposure may vary by client within the same program. [217]

Case Management Exposure - Main Effect

Several studies investigating mental health care services have concluded that case management services that link individuals to community resources and provide continuity of care during critical transitional periods make a key difference in the success of discharged mental patients.[218,219] Case management provides general support for clients through linkage to needed resources, assistance in combating bureaucratic barriers, and continuity of care and follow-up.[220,221,222,223] However, there is quite a variety of case management types and definitions ranging from minimal to intensive support. Salient dimensions of case management include those services that are more or less clinically or rehabilitation focused, provider or family based, or team rather than individually managed.[224] Programs focused on rehabilitation seek to help individuals live as independently as possible. They do this by teaching vocational, social, and independent living skills that contribute to the individual's ability to live in the community setting.[225,226,227] The degree of case management provided to clients is expected to increase based on need.[228,229,230,231,232,233]

In general, controlling for functional status and a variety of other client characteristics, case management is expected to improve the clients access to social resources and further the social integration process. Accordingly, the following hypothesis is related to the research question: ***(2) How does case management exposure influence quality of life?***

H2: (Case Management) As exposure to case management increases, individuals exhibit higher levels of quality of life.

Program Orientation - Main Effect

It is anticipated that the structural orientation of each program will affect individual quality of life. Three different program types have received much attention in the mental health practice and research literature: inpatient rehabilitation, day treatment and assertive community case management. All three program orientations have revealed potentially effective care for the seriously mentally ill.[234,235,236] The potential benefits of inpatient rehabilitation programs have been clearly demonstrated by several researchers.[237,238,239,240] Recently, however, the benefits of inpatient rehabilitation have been compared to less structured, community-oriented interventions such as day treatment. Although day treatment offers some improvement in a variety of psychosocial areas, there is some question whether day treatment is appropriate for persons with chronic and persistent mental illness.[241,242] Accordingly, a different model of care, assertive community case management, has received much attention in the recent research literature. These programs offer semi-structured activities and therapies coupled with intensive case management in a community

environment.[243,244,245] Most researchers agree that relying on one model would not be sufficient to meet the complex needs of people with SMI. Rather, varying degrees of social support, structure and service intensity are needed to meet the needs of these clients.[246,247]

In the present study, these three types of programs are of particular interest: inpatient rehabilitation (STAR), intensive community case management (IPCC), and day treatment centers (DTC). These programs represent a continuum of structured support from transitional (STAR) to intensive outpatient (IPCC) to less formalized outpatient care (DTC). The hypotheses that follow presume a STAR program offers more structured support than either an IPCC or DTC program and that a DTC program offers the least amount of structured support. STAR programs focus on sustained treatment and rehabilitation; they include transitional services prior to client discharge into a community setting. IPCC programs offer intensive psychiatric community care in an outpatient setting. DTCs are day treatment centers that offer rehabilitative and recreational activities in an outpatient setting. Although there are three primary types of programs in the study, there are fourteen separate program sites that will be analyzed in this dissertation. The following hypotheses are related to the research question: ***(3) How do programs oriented toward structured support influence quality of life?***

H3a: (Program Orientation) Compared to individuals in an IPCC program, individuals in a STAR program exhibit higher levels of quality of life.

H3b: (Program Orientation) Compared to individuals in an IPCC program, individuals in a DTC program exhibit lower levels of quality of life.

Interaction between Client and Social Structural Characteristics

In addition to the main effects described above, the moderating effects of case management and treatment programs are investigated. These moderation effects specifically relate to the notion of "fitness" introduced earlier in this chapter. Individuals with higher degrees of psycho-social impairment as indicated by psychiatric diagnosis, functional status and history of inpatient stay are expected to need greater social support in order to re-integrate into the community setting than individuals with lesser degrees of impairment. The treatment environment offers social support in a variety of forms. In this study, social support is measured in two distinct ways: case management exposure and treatment program orientation. Case management is expected to facilitate access to needed social resources and improve social skills development and social engagement. Similarly, treatment programs are oriented toward varying degrees of social support, structure and service intensity in order to meet the needs of their clients. Individuals with greater psycho-social impairment are expected to benefit more from case management services and to fare better in programs that offer a higher degree of structure and support. Based on this premise, the remaining research questions are addressed.

Case Management - Moderation Effect

Does case management differentially affect quality of life, based on a client's primary diagnosis, baseline functioning, or institutional history? Clients with schizophrenia, poor functional status and a history of longer inpatient stay may fare measurably better when receiving case management services compared to individuals with a more favorable psychiatric profile. In other words, individuals with greater

impairment are expected to require more social support and, therefore, may benefit to a greater degree as case management exposure increases. Based on this premise, the following hypotheses are proposed related to the fourth research question of interest: ***(4) How does case management moderate the effect of different aspects of the client's psychiatric profile on quality of life?***

H4a: (Case Management X Primary Diagnosis) As case management exposure increases, individuals who have schizophrenia exhibit higher levels of quality of life.

H4b: (Case Management X Functioning) As case management exposure increases, individuals who have poorer baseline functioning exhibit higher levels of quality of life.

H4c: (Case Management X Institutional Stay) As case management exposure increases, individuals who have a history of longer institutional stay exhibit higher levels of quality of life.

Program Orientation - Moderation Effect

The fifth research question asks whether programs impact quality of life differentially, based on a client's psychiatric profile. As previously noted, treatment environments offer varying degrees of social support, structure and service intensity. Clients with a less favorable psychiatric profile are expected to have greater needs for a structured environment. They may benefit to a greater extent in programs that offer routine structured activities, social and vocational skills development, and ongoing supervision in an inpatient

rehabilitation setting. I expect clients with an unfavorable psychiatric profile to fare better in terms of quality of life in more structured programs than in less structured ones. According to this premise, the following hypotheses are proposed related to the research question: ***(5) How do programs oriented toward structured support moderate the effect of different aspects of the client's psychiatric profile on quality of life?***

H5a: (Program Orientation X Primary Diagnosis) Compared to individuals with schizophrenia in IPCC programs, similar individuals in STAR programs exhibit higher levels of quality of life.

H5b: (Program Orientation X Primary Diagnosis) Compared to individuals with schizophrenia in IPCC programs, similar individuals in DTC programs exhibit lower levels of quality of life.

H5c: (Program Orientation X Functioning) Compared to individuals with poorer baseline functioning in IPCC programs, similar individuals in STAR programs exhibit higher levels of quality of life.

H5d: (Program Orientation X Functioning) Compared to individuals with poorer baseline functioning in IPCC programs, similar individuals in DTC programs exhibit lower levels of quality of life.

H5e: (Program Orientation X Institutional Stay) Compared to individuals with a history of longer institutional stay in IPCC programs, similar individuals in STAR programs exhibit higher levels of quality of life.

H5f: (Program Orientation X Institutional Stay) Compared to individuals with a history of longer institutional stay in IPCC programs, similar individuals in DTC programs exhibit lower levels of quality of life.

In this chapter I have described the conceptual model and the specific hypotheses that are tested. Figure 2.1 provides a summary of the hypothesized main and moderation effects on quality of life. The next chapter provides a fuller discussion of the research design, analytic sample, measurement and multilevel modeling. The empirical indicators displayed in Figure 2.2 will be described in detail as will the hierarchical linear modeling technique employed in this analysis.

CHAPTER III

METHODS AND ANALYTICAL PLAN

Analysis Strategy

This study is formulated as a multilevel analysis. It aims to model individual quality of life with predictor variables at three different levels of analysis; time-level, client-level and program-level. The data have a nested, multi-level structure as follows: time points nested within individual clients 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 relatively stable over time represent the client level of analysis. Program orientation represents the treatment program level of analysis. I will employ a multilevel statistical methodology to account for the nested structure of the data in determining statistical relationships. I have chosen Hierarchical Linear Modeling (HLM) as the multilevel analytical technique for this analysis.[248] HLM accommodates the nested data structure by appropriately separating out within-program and within-person variance from between-program and between-person variance.[249,250]

Traditional Ordinary Least Squares (OLS) regression approaches are not appropriate for multilevel data because they do not separately estimate individual and group level error terms. The two primary OLS approaches to dealing with multilevel data

involve disaggregating or aggregating the data in order to match the levels of analysis. Specifically, disaggregating the data occurs when one assigns group-level attributes to each individual in order to conduct an individual-level analysis. For example, I might assign treatment program type to each individual client. This option is inappropriate because it violates the assumption of independent observations underlying traditional statistical approaches. Individuals nested in the same group are exposed to similar stimuli within the group and, as a result, may have similar responses by virtue of this common effect. In other words, I would treat program type as an independent variable eventhough I know that all members of the same treatment program are assigned the same treatment program type. The association between individuals in programs and treatment program characteristics should be acknowledged rather than ignored in order to estimate accurately treatment program effects on individual level outcomes.

On the other hand, aggregating the data occurs when individual outcomes are aggregated by group in order to conduct a group-level analysis. For example, I might have chosen to aggregate the dependent variable to the treatment program level. Rather than model time-varying quality of life, I could model the average level of quality of life for a treatment program. Here, the degree to which individuals vary within groups on the outcome variable is ignored, thus discarding potentially meaningful variance.[251] Aggregation of independent variables also discards potentially meaningful variance. For example, in my analysis I have three levels of data; time point, client and treatment program. Rather than incorporate time-varying functional status, I could aggregate the

mean level of functioning for a client over time and create an individual level functioning variable. Here, I would ignore the degree of variance in functional status over time for the individual client.

HLM avoids these two common mistakes (disaggregation and aggregation) by explicitly estimating parameters at different levels of analysis thus acknowledging the partial independence of individuals within the same group.[252] HLM allows the researcher to analyze data at different levels of analysis by appropriately separating the between and within variance found in the proposed model: variance within the same clients over time, variance among clients and variance across programs.[253,254,255] Attributes at all three levels of analysis are expected to relate to the outcome: the quality of client's lives. Multiple assessments are gathered on the same client over time. In this way, the outcome, quality of life, is nested within individual. Furthermore, the contextual environment of a given program is expected to similarly affect clients nested in the same unit. With HLM, I may separate variance in quality of life into its three levels: within-client (level 1), between-client (level 2) and between-program (level 3). What follows is an explanation of the study design, sample and measures at each level of analysis included in this study.

Data

The dissertation makes use of data provided by the Veterans Health Administration's (VHA) Serious Mental Illness Treatment Research and Evaluation Center (SMITREC). One of SMITREC's projects, the Long Term Mental Health

Enhancement project (LTMHE), began in 1991 and is designed to address the needs of the VHA's neuropsychiatric hospitals and their clients with serious mental illness.[256]

Patient Population

The criteria for designation as one of the programs under study in the LTMHE project is 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 or five inpatient admissions within the past year. These clients constitute a significant number of the patients in these hospitals. A review of the Patient Treatment Files (PTF) for the hospitals included in the targeted facilities in 1991 indicated that there were over 7,000 patients meeting this criteria in the 14 sites included in this study. Serious mental illness is defined by DSM-III-R diagnosis coding[i]. Institutional dependence is defined as 150 days of hospitalization in the last calendar year and/or five instances of hospitalization for any reason in the year prior to program enrollment.

It should be noted that this is a highly dysfunctional patient population. Many clients with SMI in the VA's inpatient psychiatric system were not discharged during the first or second wave of deinstitutionalization in the 1970's and later in the 1980's. Instead, many of these patients remained primarily in an inpatient setting and are just now being deinstitutionalized. Accordingly, this study population represents a highly impaired client group transitioning to a community living environment. Due to their

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[i] The study was initiated prior to release of DSM-IV diagnosis coding.

severe impairment and heavy reliance on an inpatient treatment system, these clients present a considerable challenge to mental health service providers.

Study Design

The study targets patients in 14 Veterans Administration medical centers providing substantial amounts of care to psychiatric clients with chronic mental illness. All 14 medical centers have at least one long-term care unit that serves persons with serious mental illness (SMI). Units are considered long term when more than 50 per cent of the patients on the unit met the SMI designation as defined by DSM-III-R diagnosis coding and an institutional dependence history of at least 150 days of hospitalization in the last calendar year or five instances of hospitalization for any reason in the year prior to program enrollment. These fourteen sites have received funding to institute special programs designed to enhance the care provided for their chronic patients with SMI. In most cases, the sites have decided to implement community care programs for a substantial portion of their inpatient population. These fourteen sites represent fourteen separate treatment environments.

Each of these fourteen sites can be classified on a continuum of structured support incorporating one of three program types; ranging from STAR (most structured) to DTC (least structured) programs. This study includes five Sustained Treatment and Rehabilitation (STAR) programs, providing intensive inpatient rehabilitation. The design of these inpatient rehabilitation programs incorporates several psychosocial rehabilitation

components.[257,258] The programs offer psychological, social, and vocational evaluation and guidance/treatment, as well as functional skills training. VA program materials indicate that the guiding principle of these programs is the development of the highest level of patient functioning possible by emphasizing self-help and self-care.[259] Sufficient treatment, education, and training must be provided to allow patients to live in less restrictive environments and to facilitate their re-entry into the community. Goals, objectives, and progress notes addressing these areas are required in the treatment plan. Two additional programs most resembled the STAR programs in orientation rather than the IPCC or DTC programs and will be categorized as STAR programs for the purposes of the analysis.

Four day treatment centers (DTC) are included in this study. Day treatment is a form of partial hospitalization adopted in the U.S. in the late 1940's with the hope that it would be an alternative to inpatient care.[260,261] Day treatment typically provides structured outpatient programming 3-5 hours per day, two to five days a week to provide veterans with support and training for living in a community setting.

This study also includes three intensive community case management programs (IPCC) which provide intensive services to patients while they are residing in the community. These assertive case management programs are based on two existing community-based models: the Program for Assertive Community Treatment (PACT)[262] further adapted and tested for the VA by the NEPEC program, and the Strengths model

developed by Rapp and Wintersteen.[263] These intensive case management programs follow clients once they are discharged to the community. The models are characterized by assertive outreach to clients, small caseloads, skills training, and the availability of 24-hour crisis support.

Survey Design

An evaluation plan involves a multi-survey, multi-site, multi-wave arrangement. The surveys include clinical and patient assessments which gather clinical and psycho-social data from patients and clinicians. The VHA's computer databases and other sources contain other useful clinical and patient information. The patient assessment concentrates on clients' symptoms, abilities to perform activities necessary to remain a community setting, functional status, and perceptions of quality of life. The evaluation permits across and within program comparisons. A clinician completes the clinical assessment in reference to the client. A primary therapist or social worker completes the patient assessment in consultation with the client. Staff members complete both the patient and clinical assessments for each program participant at the time that eligibility for inclusion in a pilot program is determined, every six months for the first two years, and annually thereafter. The LTMHE project began collecting data in October 1991.

Resultant Analytic Dataset

I constrained the analytic dataset to represent clients in funded pilot programs for

at least one year with a minimum of two completed assessments.[ii] The resultant analytic dataset contains 996 individuals located in 14 separate programs and represents 4762 individual assessments or time points.

Measures

In conceptual terms, this study is concerned with the relationship between quality of life (the dependent variable) and two broad sets of predictor variables; client characteristics and treatment environment. Figure 2.2 clearly displays the conceptual basis of each of the measures included in this study. The socio-demographic, socio-economic and psychiatric profile variables represent attributes of the client whereas case management exposure and program orientation represent aspects of the treatment environment. In measurement terms, however, the issue of levels of data is slightly different. This study utilizes three levels of data; time, individual and program. This analysis incorporates three of the measures at the time level; quality of life, client functioning and case management exposure. The remaining client characteristics represent individual level data since they indicate the client's status at program entry. Finally, treatment program orientation is measured at the program level of analysis. The measures presented in this chapter are organized by conceptual grouping with the level of data analysis noted in the title parenthetically.

[ii] Fourteen programs were funded to provide enhanced programming to assist individuals transitioning from an inpatient to outpatient environment. Since *change* in quality of life is the primary concern, at least two data points are necessary.

Dependent Variable - Quality of Life *(Time Level)*

The dependent variable in this analysis is a multi-dimensional measure of quality of life. The measure is based on a standardized measurement instrument: the Lehman's Psychiatric Quality of Life interview. The QOL instrument is contained in the comprehensive and follow-up patient assessment surveys. Staff members along with clients complete 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; the client's quality of life changes over time.

Anthony Lehman specifically designed the QOL interview to be used with the seriously mentally ill client. The Lehman Quality of Life scales measure subjective (well-being) and objective (social integration) dimensions 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. Investigating the relationship between both dimensions of quality of life and the treatment environment and client factors represents the central concern of this study. The subjective dimension is measured on a 1 to 7 point "feeling" scale where 1 indicates "terrible" and 7 "delighted". A mean value is calculated for each domain area (general, housing, etc.) where at least 60% of the scale's items are completed. If more then 40% of the items in any scale are missing, the entire scale is treated as a missing value. There were too few responses to create scales for the school and job domain areas. Table 3.1 summarizes the constructed scales for the subjective quality of life indices.

Table 3.1: Construction of Subjective Quality of Life Scales

Domain Area, Number of Items and Cronbach Alpha

Scale	Number of Items	Cronbach Alpha
General	2	.75
Housing	6	.84
Family	4	.86
Social	6	.88
Leisure	6	.86
Safety	5	.90
Finances	4	.89
Health	6	.84

The objective dimension of quality of life contains 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 adding the items together or creating a mean. Unlike the subjective scales, the objective scales do not utilize a common scale. The objective scale measurement construction is summarized in table 3.2. Items are reversed as necessary and combined to construct a scale which is positively related to objective resource availability and degree of social integration.

Years *(Time Level)*

This study incorporates the passage of time as measured by the number of years that have passed since the initial program entry date recorded on the initial clinician assessment. The years variable is calculated as the number of days since program entry divided by 365 days, thus, representing a fractional measure of years.

Table 3.2: Construction of Objective Quality of Life Scales

Domain Area, Number of Items, Measure Type, Range

Domain Area	Number of Items	Measure Type	Range
Housing	4	Additive	0-4
Family	2	Mean	0-4
Social	7	Mean	0-4
Leisure	16	Additive	0-16
Safety	2	Mean	0-2
Finances	6	Additive	0-6
Health	10	Mean	0-4

Psychiatric Profile

Functioning (Time Level)

This study uses the Global Assessment of Functioning Scale (GAF) to capture the client's overall level of clinical functioning as assessed by the clinician. The GAF ranges from 1 to 90 where 1 indicates severe clinical functioning problems and 90 indicates good clinical functioning in all areas. This scale is contained in the initial clinician and follow-up assessment surveys. This instrument is administered at program entry, every six months for two years and every year thereafter for two additional years. Clinical functioning is included as a time-varying covariate in the model.

Primary Diagnosis (Individual Level)

Clients are classified with a dichotomous variable as schizophrenic (1) or non-schizophrenic (0) based on the ICD-9-CM code corresponding to the primary diagnosis

which qualified the patient for the LTMHE project as recorded in the initial clinician assessment at program entry.

Institutional Stay (Individual Level)

Prior length of stay is represented by cumulative length of stay across all VAMCs in the year prior to program entry. Specifically, this variable is measured as days in the last 12 months prior to program entry that the patient was in an inpatient setting. Program entry is determined as the date on which an initial clinician's assessment is completed for the patient.

Socio-demographic Profile

Age, Gender, Ethnicity and Marital Status (Individual Level)

Age is measured in years based on date of birth and will be included at the individual level of data as age at program entry. Gender is measured as a dichotomous variable; male (1) and female (0). Ethnicity is measured as a dichotomous variable; white (1) and non-white (0). These three variables were obtained through the VA record system by matching on social security number. Marital status is captured at program entry through the family section of the comprehensive patient assessment. There are four categories in the survey; married, widowed, separated/divorced and never married. Marital status is measured as a dichotomous variable in this dissertation; married (1) and not married (0).

Socio-economic Profile

Income, Education and Employment (Individual Level)

Three measures indicate the baseline socio-economic status (SES) of each client at program entry; income, education and employment. I constructed these measures using data from the initial comprehensive patient assessment. The income scale contains 14 items that measure access to different income sources such as SSI and food stamps. The income scale is additive and ranges from 0 to 14 with 14 representing maximum access to income sources. The education scale is ordinal and ranges from 3 to 20 indicating the highest grade completed in school between grade 3 or less (3) and graduate school (20). The employment measure is a dichotomous variable indicating paid employment at program entry; yes (1) and no (0).

Treatment Environment

Case Management (Time Level)

A time-varying dichotomous variable representing receipt of case management services at any given assessment time point was constructed. The 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. If a client was receiving case management services at the time of an assessment, they received a value of 1 on the case management variable. If they were not receiving case management services at the time of an assessment, they received a value of 0 on the case management variable.

Program Orientation (Program Level)

A series of dichotomous variables were created to indicate program type. There are three primary types of programs to be investigated representing 14 separate sites: (1) Sustained Treatment and Rehabilitation programs (STAR) and other[iii], (2) Intensive Psychiatric Community Care (IPCC) programs and (3) Day Treatment Centers (DTC). The distribution of program types is as follows: 7 STAR, 3 IPCC and 4 DTC. I will treat the IPCC group as the referent category at the analytic stage.

I have provided a detailed discussion of the measures used in the analyses. Now, I turn to a discussion of the general multilevel model as applied in this dissertation. I also describe other salient features of multilevel modeling such as cross-level effects and treatment of missing data.

Multilevel Model - General

This analysis tests a three-level model represented by three general sub-models corresponding to each level: time, individual and program. A full description of all multilevel models tested in this analysis is contained in Appendix B. For ease of explanation, I provide here a general submodel in equation form for each level of analysis.

Level 1 *(Time Level)*

$$Y_{tij} = \pi_{0ij} + \pi_{1ij}(time)_{tij} + \pi_{2ij}(a)_{tij} + e_{tij}$$

[iii] Two sites contain program elements (enhanced inpatient programming or a halfway house) outside the three-category scheme. These programs are most similar to the STAR-type programs and are, therefore, coded as STAR programs for the purpose of analysis.

where Y_{tij} is the outcome variable at time t for individual i in group j, for example, quality of life for each client at each time point;

$(time)_{tij}$ is the passage of time at time t for individual i in group j, for example, years passed since program entry for each client at each time point;

$(a)_{tij}$ can be any time-varying covariate associated with the individual and as such, represents the value on the predictor at time t for individual i in group j , for example, functional status for each client at each time point;

π_{0ij} is the expected outcome of individual i in group j at time 0, for example, quality of life at program entry;

π_{1ij} is the rate of change for individual i in group j over the data-collection period, for example, change in quality of life from program entry for each client over time;

π_{2ij} is the effect of the time-varying covariate (a) for individual i in group j over the data-collection period, for example, the effect of functional status on quality of life for each client over time; and

e_{tij} is the residual within-individual variance and is assumed to be independently and normally distributed with a mean of zero and constant variance, σ^2.

At level 1, π_{0ij}, π_{1ij}, and π_{2ij} are the within-individual intercepts and slopes estimated separately for each individual. These parameters (π_{0ij}, π_{1ij}, and π_{2ij}) may vary

significantly between individual clients. At the next level of analysis, the individual level, I can model these parameters using individual level predictor variables such as psychiatric diagnosis and history of inpatient stay. In other words, the baseline level of quality of life at program entry (π_{0ij}) or change in quality of life over time (π_{1ij}) may vary significantly between individuals. Perhaps psychiatric diagnosis or history of inpatient stay would explain this individual level variance in quality of life.

Level 2 *(Individual Level)*

$$\pi_{0ij} = \beta_{00j} + \beta_{01j}(X)_{ij} + r_{0ij}$$

$$\pi_{1ij} = \beta_{10j} + \beta_{11j}(X)_{ij} + r_{1ij}$$

$$\pi_{2ij} = \beta_{20j}$$

where π_{0ij}, π_{1ij} and π_{2ij} as defined above;

$(X)_{ij}$ is the value on the predictor for individual i in group j, for example, a '1' or a '0' on the variable psychiatric diagnosis of schizophrenia;

β_{00j} is the mean initial status within-group j, for example, the mean quality of life at program entry for clients in group j;

β_{01j} is the effect of (X) on the initial status within-group j, for example, the average effect of psychiatric diagnosis on quality of life at program entry for clients in group j;

β_{10j} is the mean rate of change within-group j, for example, the average change in quality of life for clients in group j;

β_{11j} is the effect of (X) on the rate of change within-group j, for

example, the average effect of psychiatric diagnosis on change in quality of life for clients in group j;

β_{20j} is the mean effect of (a) within-group j, for example, the average effect of functional status on quality of life for clients in group j;

r_{0ij} is the residual within-group variance associated with π_{0ij}; and

r_{1ij} is the residual within-group variance associated with π_{1ij}.

At level 2, β_{00j}, β_{01j}, β_{10j}, β_{11j} and β_{20j} are the within-group intercepts and slopes estimated separately for each program. I expect some of these parameters (β_{00j}, β_{01j}, β_{10j}, β_{11j}) to vary significantly between treatment programs and will, therefore, treat them as *random effects*. At the next level of analysis, the program level, I can model these randomly-varying parameters using program level predictor variables such as treatment program orientation. In contrast β_{20j} is treated as a *fixed effect* and is not expected to vary significantly between individuals. In other words, the relationship between functional status and quality of life (functional status-quality of life slope) is expected to be similar across individuals. This assumption can be tested with the chi-square statistic which indicates whether any parameter (intercept or slope) varies significantly between units. In this analysis, the units include individuals and programs. When the chi-square statistic indicates that a parameter does not vary significantly between individuals or programs that parameter (intercept or slope) can be treated as a *fixed effect*.

Level 3 *(Program Level)*

$\beta_{00j} = \gamma_{000} + \gamma_{001}(W)_j + \mu_{00j}$

$\beta_{10j} = \gamma_{100} + \gamma_{101}(W)_j + \mu_{10j}$

$\beta_{01j} = \gamma_{010} + \gamma_{011}(W)_j + \mu_{01j}$

$\beta_{11j} = \gamma_{110} + \gamma_{111}(W)_j + \mu_{11j}$

$\beta_{20j} = \gamma_{200} + \gamma_{201}(W)_j + \mu_{20j}$

where β_{00j}, β_{10j}, β_{01j}, β_{11j} and β_{20j} are defined previously;

$(W)_j$ is the value on the predictor for group j, for example, '1' or '0' on the STAR program orientation variable;

γ_{000} is the overall mean initial status, for example, quality of life at program entry across all clients across all programs;

γ_{001} is the overall effect of (W) on initial status, for example, the effect of being in a STAR program on quality of life at program entry across all clients across all programs;

γ_{100} is the overall rate of change, for example, change in quality of life across all clients across all programs;

γ_{101} is the overall effect of (W) on the rate of change, for example, the effect of being in a STAR program on change in quality of life across all clients across all programs;

γ_{010} is the overall effect of (X) on initial status, for example, the effect of psychiatric diagnosis on quality of life at program entry across all clients across all programs;

γ_{011} is the effect of (W) on the relationship between (X) and initial status, for example, the effect of being in a STAR program on the relationship between psychiatric diagnosis and

quality of life at program entry across all clients across all programs;

γ_{110} is the overall effect of (X) on the rate of change, for example, the effect of psychiatric diagnosis on change in quality of life across all clients across all programs;

γ_{111} is the effect of (W) on the relationship between (X) and the rate of change, for example, the effect of being in a STAR program on the relationship between psychiatric diagnosis and change in quality of life across all clients across all programs;

γ_{200} is the effect of (a) across groups, for example, the average effect of functional status on quality of life across all clients across all programs;

γ_{201} is the effect of (W) on the relationship between (a) and quality of life, for example, the effect of being in a STAR program on the relationship between functional status and quality of life across all clients across all programs;

μ_{00j} is the group-level residual associated with β_{00j};

μ_{10j} is the group-level residual associated with β_{10j};

μ_{01j} is the group-level residual associated with β_{01j};

μ_{11j} is the group-level residual associated with β_{11j}; and

μ_{20j} is the group-level residual associated with β_{20j}.

At level 3, γ_{000} through γ_{201} are the group-level intercepts and slopes estimated across groups. In specific, γ_{011} and γ_{111} represent the moderation effect of the group-level variable W (e.g. STAR program) on the relationship (β_{01j} and β_{11j}) between individual-

level variable X (e.g. psychiatric diagnosis) and the outcome variable. In other words, I expect that STAR programs will significantly affect the relationship between psychiatric diagnosis and quality of life. Here, I am assuming that β_{0ij} and β_{1ij} vary significantly across groups. I can use an empirical test to verify whether these parameters do vary significantly from group to group.

If β_{0ij} or β_{1ij} do not vary significantly across groups it would not make sense to model them using group-level predictors. Therefore, the proposed models may not be supported empirically in the case where intercept or slope variances are not significantly different than zero across groups. I may find little support for treating some effects as random based on the chi-square statistic. In other words, although I might propose a specific level-3 HLM model, the actual pattern of the variance in the level-2 intercepts and slopes might translate into different level-3 models.

Special methodological issues related to HLM

There are two particular methodological issues about the use of HLM for empirical modeling that are specific to the analysis in this dissertation: (1) interaction terms and (2) missing values. Interactions between variables take-on different operational definitions depending on whether the variables involved in the interaction are measured at the same or a different level of analysis. Additionally, missing values are handled differently depending on which level of analysis they occur. These differences are discussed below.

Interactions between levels

HLM incorporates interaction effects between two levels of analysis by using the higher level predictors to model the parameters (intercepts and slopes) produced from a lower level regression analysis. In other words, both intercepts and slopes are modeled as outcomes. For example, the program orientation variable is used to predict the relationship between a client-level characteristic of interest (e.g. primary diagnosis) and the dependent variable of interest (quality of life). In other words, I hypothesize that the relationship between primary diagnosis and quality of life varies across programs considered in this study. I believe that program orientation (or program type) will affect the relationship between primary diagnosis and quality of life. This is a cross-level interaction.

Interactions within the same level

Interaction terms within the same level of analysis are handled in the same manner as for any general linear model technique: as a product term. Therefore, the interactions proposed between variables measured at the same level of analysis are created as explicit product terms. In this analysis, the moderation effect of case management on the relationship between the client's clinical status and quality of life will be tested by creating the appropriate interaction term (e.g. case management x clinical status) at the within-client level of analysis.

Treatment of missing values

HLM can accommodate missing values at level 1 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. HLM cannot handle missing values at higher levels of aggregation. In this study, no data were missing about programs (level 3). At the client level (level 2), mean values across the entire dataset were substituted for cases with missing values.

CHAPTER IV

DESCRIPTIVE RESULTS

Before presenting the results of the multilevel models, it is important to understand something about the particular clients with serious mental illness included in this study. Accordingly, this chapter presents overall descriptive statistics for the study sample. I begin by describing the availability of data for the respondent group in terms of number of assessments and distribution by site. Then, I present overall means and standard deviations by level of analysis including individual level statistics by program type. Next, I present and provide a discussion of the pearson correlation matrix, focusing on associations of particular interest. Finally, I discuss trends in quality of life over time and differences in these trends by program type and other salient groupings. These descriptive results are discussed in terms of their implications for the analytic results.

Number of Assessments and Clients by Location

This investigation includes all individuals from the Serious Mental Illness Treatment Research and Evaluation Center (SMITREC) study who have been enrolled in the study for at least one year and for whom at least two assessments are available. The resultant sample includes 4762 timepoints, 996 individuals and 14 programs. Table 4.1 provides a frequency distribution of the number of assessments included in the study by individual respondent. Thirty six respondents (3.6%) completed two assessments with the remaining 960 respondents (96.4%) completing three or more assessments.

Recall that assessments were completed on the following schedule: at program entry, at six months, at 12 months, at 18 months, at two years and every year thereafter. The maximum number of assessments represented in this sample is 7, corresponding to persons with a program tenure at or greater than four years. I have chosen an analytic method (HLM) that allows for variable program exposure since respondents' exposure ranges from one year to greater than or equal to four years. The method also allows for skipped and missing assessments.

TABLE 4.1: Distribution of number of assessments for all respondents

COUNT	Cumulative Frequency	Cumulative Percent	Frequency	Percent
2	36	3.6	36	3.6
3	157	15.8	193	19.4
4	231	23.2	424	42.6
5	261	26.2	685	68.8
6	208	20.9	893	89.7
7	103	10.3	996	100.0

Table 4.2 provides a frequency distribution of the number of respondents by each of the fourteen program sites. There is a relatively balanced distribution

of respondents across the fourteen programs with the fewest number of individuals (n=27) in facility 12 and the most (n=102) in facility 6. Roughly between 3 and 10% of the sample is represented in each of the fourteen programs. In other words, no single program contains more than 10% of the sample. Table 4.3 displays the number of respondents by each program type (STAR, DTC and IPCC). Most individuals are in STAR programs (n=517) with fewer in IPCC programs (n=258) and the least number in DTC programs (n=221).

TABLE 4.2: Distribution of respondents by each of the fourteen program sites

Facility	Cumulative Frequency	Cumulative Percent	Frequency	Percent
01	82	8.2	82	8.2
02	50	5.0	132	13.3
03	91	9.1	223	22.4
04	80	8.0	303	30.4
05	73	7.3	376	37.8
06	102	10.2	478	48.0
07	71	7.1	549	55.1
08	65	6.5	614	61.6
09	94	9.4	708	71.1
10	39	3.9	747	75.0
11	85	8.5	832	83.5
12	27	2.7	859	86.2
13	91	9.1	950	95.4
14	46	4.6	996	100.0

Means and Standard Deviations

Tables 4.4 and 4.5 present the means and standard deviations for the time level data. Table 4.4 displays the objective and subjective dependent variables while table 4.5 displays the time-level covariates including years, clinical functioning and case management.

Quality of Life Variables

As displayed in table 4.4, each of the subjective quality of life domains can be judged against each other since they are measured on the common Terrible-Delighted scale range of 1-7. Individuals are least satisfied with their financial situation over time (mean=4.00) and most satisfied with their overall safety over time (mean=5.01).

Each of the objective quality of life variables must be evaluated separately from each other as these scales lack the commonality of the subjective scale. Rather, the objective scales 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 area, the more socially integrated the individual respondent.

Time-Level Covariates

Table 4.5 provides detail on the time-level covariates. First, I can see that respondents included in this study are in the treatment program for a maximum of about four and one-half years. The zero minimum value indicates the baseline years value at program entry. However, only individuals enrolled in the treatment programs for at least one year are included in this analysis. Across individuals in the program (n=996) the mean program tenure is 2.68 years with a standard deviation of .96.

TABLE 4.3: Distribution of respondents by each program type

Program Type	Cumulative Frequency	Cumulative Percent	Frequency	Percent
DTC	221	22.2	221	22.2
IPCC	258	25.9	479	48.1
STAR	517	51.9	996	100.0

TABLE 4.4: Means and Standard Deviations of Quality of Life Variables

Variable	N	Mean	Std Dev	Minimum	Maximum
Subjective Quality of Life					
FAMILY	3087	4.708989	1.245310	1.000000	7.000000
FINANCES	3206	3.996722	1.601853	1.000000	7.000000
GENERAL	3303	4.550257	1.367470	1.000000	7.000000
HEALTH	3312	4.811781	0.977625	1.000000	7.000000
HOUSING	3362	4.688263	1.096619	1.000000	7.000000
LEISURE	3419	4.717134	1.012162	1.000000	7.000000
SAFETY	3309	5.009589	1.053919	1.000000	7.000000
SOCIAL	3361	4.776629	0.969934	1.000000	7.000000
Objective Quality of Life					
FAMILY	3420	2.193713	1.024119	1.000000	5.000000
FINANCE	3934	4.658109	1.859354	0	6.000000
HEALTH	3947	3.352341	0.727272	1.000000	5.000000
HOUSING	4052	3.903011	0.337298	0	4.000000
LEISURE	4201	8.568436	3.085549	0	16.000000
SAFETY	3988	2.901705	0.297118	1.000000	3.000000
SOCIAL	4045	1.914040	0.923587	1.000000	5.000000

Table 4.5 also reveals that this group tends to have serious impairments in psychosocial functioning as indicated by the mean GAF value of 46.76 across the sample over time. However, caution is urged in evaluating this psychiatric measure based on a

single sample mean. The clinical functioning variable (GAF) tends to show a substantial range of values. In other words, there is considerable variation in the level of clinical functioning among clients in this sample.

Finally, table 4.5 indicates that, on average, 32% of the time individuals are receiving case management services. The minimum value of 0 and maximum value of 1 simply reflects the dichotomous nature of the case management variable.

Individual-Level Covariates

Table 4.6 presents the means and standard deviations for the individual level data. On the whole, the socio-demographic profile of the sample indicates single white males with an average age of 50 years. The age does range from 21 to 83 years. Additionally, women (4%), married individuals (8%) and non-whites (17%) are also included in the sample. The socio-economic profile indicates that the average person has completed highschool (mean=12.22), does not currently have a job (86%) and receives at least two sources of income. Again, these individuals do vary in their socio-economic profile as displayed by the standard deviations and minimum and maximum values.

Finally, at the individual level, the psychiatric profile of the client incorporates information on psychiatric diagnosis and prior inpatient stay. 81% of this population has a diagnosis of schizophrenia. The average inpatient stay in the 12 months prior to program entry is 204 days.

TABLE 4.5: Means and Standard Deviations of Time Level Covariates

Variable	N	Mean	Std Dev	Minimum	Maximum
Time in Years	4762	1.391006	1.121282	0	4.5699
Functioning	4473	46.761905	14.720058	1.0000	99.0000
Case Management	4523	0.324342	0.468180	0	1.0000

Individual Level Data by Program Type

Table 4.7 presents the means and standard deviations for the individual level data by program type. This table illustrates differences in the client make-up of each program by socio-demographic, socio-economic and psychiatric profile. STAR programs tend to have older patients (mean=51.41), followed by IPCC programs (mean=49.90) and DTC programs (47.76). Still, the overwhelming majority of the patients in all programs are single white males. Socio-economically, the groups tend to have similar educational and income levels, however, their employment status varies considerably. 27% of the respondents in IPCC programs indicate current employment followed by 11% in STAR programs and 8% in DTC programs. This likely indicates different program orientations toward structured activities related to vocational skills development and sheltered employment.

TABLE 4.6: Means and Standard Deviations of Individual Level Variables

Variable	N	Mean	Std Dev	Minimum	Maximum
Socio-Demographic Profile					
AGE	988	50.199362	12.774651	21.300000	82.520000
MALE	988	0.957490	0.201852	0	1.000000
MARRIED	988	0.088057	0.283521	0	1.000000
WHITE	988	0.830972	0.374967	0	1.000000
Socio-Economic Profile					
EDUCATION	883	12.216308	2.672758	3.000000	20.000000
INCOME SOURCES	875	1.846857	1.314189	0	14.000000
EMPLOYMENT	895	0.143017	0.350286	0	1.000000
Psychiatric Profile					
SCHIZOPHRENIA	996	0.814257	0.389094	0	1.000000
INPATIENT STAY	921	203.948969	128.216302	0	365.000000

The psychiatric profile reveals that, IPCC programs tend to have more individuals with a diagnosis of schizophrenia than either DTC or STAR programs. STAR programs tend to have individuals with a history of longer inpatient stay (mean=222 days) followed by DTC programs (mean=196 days) and IPCC programs (mean=178 days).

TABLE 4.7: Means and Standard Deviations of Individual Level Variables by Program Type

Variable	N	Mean	Std Dev	Minimum	Maximum
Day Treatment Center (DTC)					
AGE	221	47.7640724	12.3468486	23.6300000	79.2800000
MALE	221	0.9321267	0.2520994	0	1.0000000
MARRIED	221	0.0769231	0.2670743	0	1.0000000
WHITE	221	0.7828054	0.4132722	0	1.0000000
EDUCATION	194	12.1082474	2.6954450	3.0000000	19.0000000
INCOME SOURCES	192	1.9479167	1.1878071	0	7.0000000
EMPLOYMENT	196	0.0765306	0.2665260	0	1.0000000
SCHIZOPHRENIA	221	0.7918552	0.4069026	0	1.0000000
INPATIENT STAY	219	195.5068493	106.9171149	0	365.0000000
Intensive Psychiatric Community Care (IPCC)					
AGE	258	49.9022481	12.3331379	22.8100000	79.2300000
MALE	258	0.9689922	0.1736755	0	1.0000000
MARRIED	258	0.0775194	0.2679335	0	1.0000000
WHITE	258	0.8449612	0.3626451	0	1.0000000
EDUCATION	229	12.6877729	2.6831392	4.0000000	20.0000000
INCOME SOURCES	225	2.0088889	1.1377889	0	7.0000000
EMPLOYMENT	230	0.2695652	0.4447017	0	1.0000000
SCHIZOPHRENIA	258	0.8992248	0.3016159	0	1.0000000
INPATIENT STAY	248	177.6532258	135.4022673	0	365.0000000

TABLE 4.7: Continued

Variable	N	Mean	Std Dev	Minimum	Maximum
Sustained Treatment and Rehabilitation Programs (STAR)					
AGE	509	51.4073281	13.0387753	21.3000000	82.5200000
MALE	509	0.9626719	0.1897510	0	1.0000000
MARRIED	509	0.0982318	0.2979206	0	1.0000000
WHITE	509	0.8447937	0.3624574	0	1.0000000
EDUCATION	460	12.0271739	2.6351943	3.0000000	20.0000000
INCOME SOURCES	458	1.7248908	1.4306249	0	14.0000000
EMPLOYMENT	469	0.1087420	0.3116477	0	1.0000000
SCHIZOPHRENIA	517	0.7814313	0.4136755	0	1.0000000
INPATIENT STAY	454	222.3854626	130.9027877	0	365.0000000

Correlation Matrices

Table 4.8 presents the pearson correlations for the time, individual and program level data constrained to the time level (n=4762). These are bivariate correlations across three levels of analysis and, therefore, should be interpreted with caution. Associations among variables measured at the same level of analysis can be interpreted in a straightforward manner. However, associations among variables measured at different levels of analysis must be evaluated in light of the nesting effect; time points nested within individuals, nested within programs. This nesting exaggerates the strength of the measured correlations. Accordingly, although an overall cross-level correlation matrix is included, interpretations will be offered only for correlations computed at the same level of analysis.

Table 4.8 Pearson Correlation Matrix of Variables Used in HLM Analysis: Time - Level Relationships

*** p≤.001; ** p≤.01; * p≤.05

(n = 4762)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Subjective Quality of Life															
1. *Family*	-														
2. Finance	.19***	-													
3. General	.35***	.30***	-												
4. Health	.38***	.28***	.57***	-											
5. Housing	.27***	.27***	.43***	.45***	-										
6. Leisure	.38***	.32***	.56***	.56***	.58***	-									
7. Safety	.34***	.24***	.41***	.53***	.46***	.48***	-								
8. Social	.41***	.26***	.53***	.54***	.47***	.65***	.47***	-							
Objective Quality of Life															
9. Family	.34***	.05*	.11***	.10***	.09***	.08***	.08***	.09***	-						
10. Finance	.12***	.60***	.20***	.20***	.20***	.22***	.20***	.18***	.06***	-					
11. Health	.27***	.23***	.55***	.56***	.28***	.49***	.35***	.43***	.08***	.15***	-				
12. Housing	.08***	.09***	.10***	.08***	.06***	.09***	.09***	.09***	.04*	.11***	.08***	-			
13. Leisure	.15***	.11***	.23***	.22***	.29***	.30***	.17***	.26***	.26***	.10***	.23***	-.01	-		
14. Safety	.11***	.17***	.10***	.14***	.17***	.14***	.24***	.11***	-.01	.18***	.15***	.03*	.01	-	
15. Social	.09***	.02	.12***	.09***	.16***	.17***	.06***	.21***	.32***	.06***	.07***	-.04*	.35***	-.06***	-
16. Years	-.02	.40***	.11***	.01	.07***	.09***	.01	.04***	-.05**	.29***	.06***	-.04*	-.03*	.08***	-.04**
17. GAF	.11***	.14***	.07***	.13***	.21***	.15***	.17***	.14***	.23***	.17***	.02***	.01	.21***	.06***	.23***
18. Case Management	-.02	.01	.06***	.05**	.03	.08***	-.01	.06***	.03	.04*	.10***	-.01	.12***	-.02	.20***
Individual Level Covariates															
19. Age	-.02	.01	-.01	-.05**	-.04*	-.01	.04*	.03	-.20***	.06**	.03	.04*	-.30***	.06***	-.21***
20. Male	.06**	-.01	.03	.05**	-.04*	.01	.04**	.01	-.11***	.02	.07***	-.01	-.06***	.01	-.13***
21. Married	-.03	.02	-.03	-.03*	.01	-.02	.04**	.01	.02	-.00	-.04**	.03*	-.03*	-.00	.02
22. White	-.02	.05**	-.04*	-.00	.02	-.01	.04*	-.01	-.02	.06***	-.11**	.02	-.07***	-.01	-.04**
23. Education	.01	.00	.02	.02	-.00	-.00	-.01	-.00	.14***	.01	.02	.03*	15***	-.06***	.19**
24. Income	-.00	.03	.03	-.03	.02	.00	-.06***	.00	.14***	.05**	-.02	.03*	.12***	-.08***	.12***
25. Employment	.01	.02	.04*	.06***	.01	.03	.02	.04**	.04**	-.03*	.09**	.02	.08***	-.04**	.08***
26. Schizophrenia	.04*	.06***	.14***	.10***	.01	.10***	.01	.08***	-.03	.02	.13***	.05*	-.01	.01	-.10***
27. Inpatient Stay	-.01	.05**	.03	.03	-.02	-.01	.05**	-.01	-.10***	.03	.06***	.07***	-.08***	.09***	-.30***
Program Level Covariates															
28. DTC Program	-.04*	-.04*	.01	-.04*	.05**	.01	-.05**	-.01	.02	.00	-.09***	-.17***	.04*	.06***	.70***
29. STAR Program	.05**	-.01	-.06***	.01	-.02	-.07***	.04*	-.06***	-.02	-.03*	-.06***	.05***	-.11***	.01	-.21***
30. IPCC Program	-.02	.05**	.05**	.03	-.03	.07***	.00	.07***	.00	.04*	.14***	.10***	.09***	-.07***	.17***

Table 4.8 Pearson Correlation Matrix of Variables Used in HLM Analysis: Time - Level Relationships

*** p≤.001; ** p≤.01; * p≤.05

(n = 4762)	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Subjective Quality of Life															
1. Family															
2. Finance															
3. General															
4. Health															
5. Housing															
6. Leisure															
7. Safety															
8. Social															
Objective Quality of Life															
9. Family															
10. Finance															
11. Health															
12. Housing															
13. Leisure															
14. Safety															
15. Social															
16. Years	-														
17. GAF	.03	-													
18. Case Management	-.06***	-.00	-												
Individual Level Covariates															
19. Age	.01	-.10***	-.04**	-											
20. Male	.03	-.09***	.00	.11***	-										
21. Married	-.01	.07***	-.04**	.16***	-.06***	-									
22. White	.01	.02	.01	.10***	-.02	.03	-								
23. Education	-.00	.09***	.06***	-.24***	-.11***	-.01	.04**	-							
24. Income	.03	-.00	.04**	-.10***	-.05**	-.03	.01	.10***	-						
25. Employment	.02	.02	.11***	-.11***	.02	-.04**	-.01	.04*	.21***	-					
26. Schizophrenia	.02	-.14**	.09***	-.13***	.13***	-.19***	-.07***	-.06***	.03*	.05**	-				
27. Inpatient Stay	.00	-.20***	-.10***	.06***	.05***	-.04**	-.03***	-.12***	-.01	-.02	.13***	-			
Program level Covariates															
28. DTC Program	-.02	.06***	.07***	-.08***	-.07***	-.01	-.05***	-.03	.04**	-.12***	-.03*	-.03	-		
29. STAR Program	.02	.03***	-.60***	.07***	.02	.04**	.04**	-.07***	.10***	-.09***	-.07***	.11***	-.56***	-	
30. IPCC Program	.00	-.09***	.62***	-.00***	.04**	-.04**	-.00	.11***	.07***	.21***	.11***	-.10***	-.31***	-.61***	-

Quality of Life – Objective and Subjective Associations

On the whole, the subjective quality of life variables are highly positively correlated with each other across all domain areas ($p \leq .001$). Satisfaction in any one subjective domain area (family – social) is significantly related to satisfaction in any other subjective domain area. It is also the case that the subjective quality of life variables are highly positively correlated ($p \leq .001$) with the objective quality of life variables with two exceptions. First, subjective financial quality of life and objective family quality of life are positively correlated, but at a lesser level of significance (+.047, $p=.02$). Second, how one feels about their financial situation does not significantly related to one's engagement in social activity. On the whole, however, one's objectively measured quality of life is positively related to one's subjectively measured well-being across most domain areas.

This pattern does not follow to the associations among the objectively measured quality of life variables. Although most of the 28 measured associations between the seven objective quality of life domains are significantly and positively correlated ($p \leq .001$), six exceptions should be noted. First, housing quality was related to the following three domains at a lesser level of significance ($p \leq .05$); family, safety and social. Still, quality of housing was positively related to degree of family involvement and degree of objectively measured safety. Quality of housing was negatively related to degree of social engagement, suggesting that as housing quality improves individuals may feel more isolated and have less opportunity for social engagement. Second, the following three associations are not statistically significant; family and safety, housing and leisure and leisure and safety. In other words, how one objectively measures their degree of safety is not related to one's engagement in leisure activity or involvement with family members. Additionally, quality of housing is not significantly related to leisure activity. Overall, however, most objective quality of life domains are significantly and

positively related to most subjective quality of life domains. This suggests that the well-being of persons with SMI improves as their degree of social integration increases.

Associations among Time-Level Covariates

This section provides a discussion of the time-level covariates included in this analysis: years (program tenure), clinical functioning (GAF) and case management exposure. Program tenure (as measured in years) is positively and significantly ($p \leq .01$) related to several domains of subjective (finances, general, housing, leisure, social) and objective (finances, health, safety) quality of life. In other words, as one's tenure in the program increases so does their general well-being and their satisfaction with their housing, financial situation, leisure time and social activities. Additionally, one's access to financial resources, health status and degree of safety improves as program tenure increases. However, program tenure is not consistently related to improvement across all quality of life domains and dimensions. Length of time in the treatment program is negatively ($p \leq .03$) related to objectively measured family relations, social engagement, leisure activity and housing quality. It appears that as clients remain in treatment programs, they have less involvement with family members, remain or become more socially isolated, experience worse housing quality and engage in fewer leisure and social activities. There is no significant relationship between program tenure and well-being in the family, health or safety domains.

Clinical Functioning

The clinical functioning measure (GAF) displayed rather consistent associations with the objective and subjective quality of life variables. Recall that a high score on the GAF instrument indicates a high level of functioning. With one exception, improved clinical status is positively correlated with improved quality of life across all domains and

dimensions ($p \leq .05$). Functional improvement as measured by the GAF is not significantly associated with objective housing quality.

Case Management

Case management is significantly ($p \leq .01$) and positively related to both the objective and subjective dimensions of quality of life in the following domain areas: general, health, leisure and social. Case management is not significantly related to the remaining domain areas in both the objective and subjective dimensions of quality of life: family, finances, housing and safety. These consistent findings across subjective and objective dimensions of quality of life suggest a common association between case management services and well-being and social integration. Case management services may strongly influence engagement in leisure and social activities and thereby improve satisfaction in these areas. Additionally, case managers may be able to link individuals with health care resources thus increasing their health status and satisfaction with their health status. These three elements combined, satisfaction with leisure and social activities and health status, may contribute to the overall high level of general quality of life.

Case managers may experience more difficulty or barriers in improving quality of life as it relates to family, finances, housing or safety. Perhaps there are outside influences which override the best efforts of case managers in improving well-being in these domain areas. For example, legislative decisions and community factors outside the control of the treatment program or case manager could greatly affect the availability of financial resources, housing quality and degree of safety in the community. In a similar way, case managers may have little control or influence over the degree to which clients have contact with family members.

Associations among Individual-Level Covariates

Table 4.9 presents the pearson correlations for the individual and program level data constrained to the individual level (n=996). With the exception of the correlations with program type, this correlation matrix allows one to accurately check the correlation between individual level variables at the same level of analysis. Discussion follows in relation to each of the profile groups included at the individual level: socio-demographic profile, socio-economic profile and psychiatric profile.

Among the socio-demographic variables, age is significantly ($p \leq .01$) and positively related to being male, married and white. Age is also significantly ($p \leq .01$), but negatively related to the socio-economic variables: income, educational level and employment status. Additionally, being male is negatively related to educational level ($p \leq .01$). Among the socio-economic variables, income is significantly and positively related to educational level and employment status ($p \leq .01$).

In terms of the psychiatric profile, having a diagnosis of schizophrenia is negatively associated with age and being married ($p \leq .01$). Additionally, a diagnosis of schizophrenia is highly associated with being male in this sample ($p \leq .01$). Individuals with a history of longer inpatient stay tend to be older and have a lower level of education ($p \leq .01$). Among the psychiatric variables, having a diagnosis of schizophrenia is significantly related to a history of longer inpatient stay ($p \leq .001$).

It should be clear from a review of the correlation matrices alone that appropriate statistical controls need to be included in order to account for the associations between variables in this study. The sample has been described in terms of the availability of survey assessments over time, client functional status, receipt of case management services and important socio-demographic, socio-economic and psychiatric dimensions.

Table 4.9 Pearson Correlation Matrix of Variables used in HLM Analyses: Individual - Level Relationships

*** p≤.001; ** p≤.01; * p≤.05

(n = 996)	1	2	3	4	5	6	7	8	9	10	11	12
Individual Level Covariates												
1. Age	-											
2. Male	.12***	-										
3. Married	.14***	-.06	-									
4. White	.09**	-.01	.03	-								
5. Education	-.24***	-.11***	-.00	.05	-							
6. Income	-.10**	-.05	-.03	.00	.11***	-						
7. Employment	-.11***	.02	-.03	.00	.05	.22***	-					
8. Schizophrenia	-.11***	.12***	-.18***	-.06	-.06	.03	.04	-				
9. Inpatient Stay	.09**	.06	-.05	-.04	-.13***	-.01	-.04	.13***	-			
Program Level Covariates												
10. DTC Program	-.10***	-.07*	-.02	-.07*	-.02	.04	-.10**	-.03	-.04	-		
11. STAR Program	.10**	.03	.04	.04	-.07*	-.10**	-.10**	-.09**	.14***	-.60***	-	
12. IPCC Program	-.01	.03	-.02	.02	.10**	.08	.21***	.13***	-.12***	-.31***	.61***	-

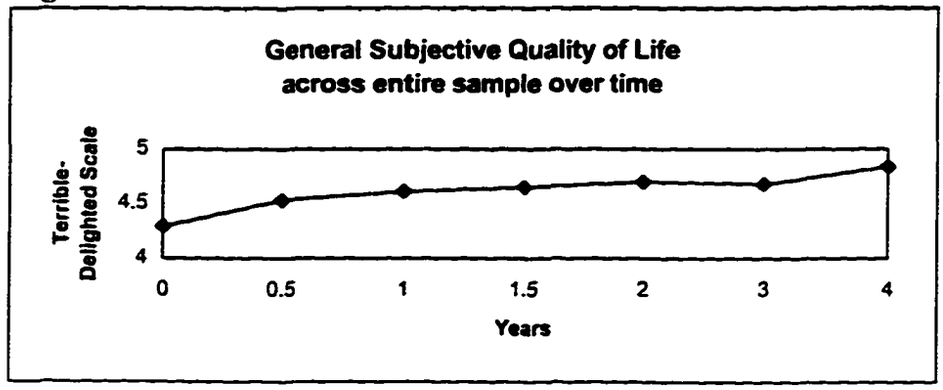
Trends in Quality of Life Over Time

The descriptive statistics presented thus far provide a snapshot of the sample under study, but do not exploit the longitudinal nature of the data to describe change in quality of life over time. This next section provides a discussion and graphical depiction of change in quality of life over time by different salient groupings. Rather than chart all domains of quality of life, the general subjective quality of life measure has been chosen. Trends in general quality of life over time will be presented in the following order: overall, by treatment program type, by psychiatric diagnosis, by prior length of stay, by clinical status and by case management.

Overall

Figure 4.1 reveals that general subjective quality of life does increase over time across the entire sample. The sharpest increase in quality of life appears to occur during the first six months of treatment program participation. This may simply reveal a Hawthorne-type effect of participation in something "new". However, the gradual increase in quality of life over time does suggest a real effect of time in program or program tenure. It is unlikely that this trend in quality of life improvement is uniform across all sub-groups of the sample under study.

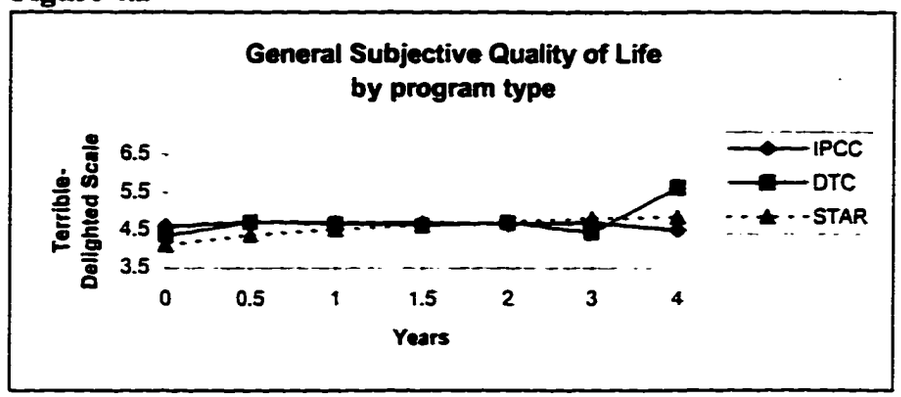
Figure 4.1



Treatment Program Type

Figure 4.2 displays change in general subjective quality of life by treatment program type. This graph reveals that STAR program participants start-off with the lowest level of general quality of life, followed by DTC and IPCC participants. Overall the general quality of life of IPCC participants does not change considerably while STAR participants appear to experience an overall gradual improvement in general quality of life. Thus, it is important to control for the effect of type of treatment program on quality of life.

Figure 4.2

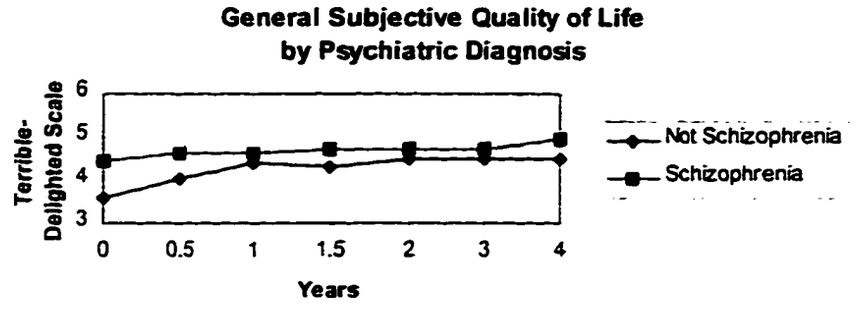


Psychiatric Diagnosis

Figure 4.3 displays the different trends in quality of life for persons diagnosed with schizophrenia versus other diagnostic groups. Surprisingly, schizophrenics start-out with a higher level of general quality of life and maintain this higher level throughout participation in the treatment program. This is surprising since most past research has tended to demonstrate that persons with schizophrenia have a lower measured quality of life than individuals with a non-schizophrenic diagnosis. This graphical display does not account for other salient covariates which may ultimately affect the well-being of schizophrenics disproportionately. For example, individuals with schizophrenia may be

receiving case management services to a greater degree than persons without schizophrenia and this case management may result in a higher quality of life. Or, more subtly, individuals with schizophrenia may benefit more from the provision of case management services. Recall that specific hypotheses address both of these issues. Although persons without schizophrenia start off with a lower level of quality of life at program entry, they do exhibit a sharper increase in quality of life within the first year of the treatment program. Again, further argument that diagnostic grouping should be included in the subsequent analyses.

Figure 4.3

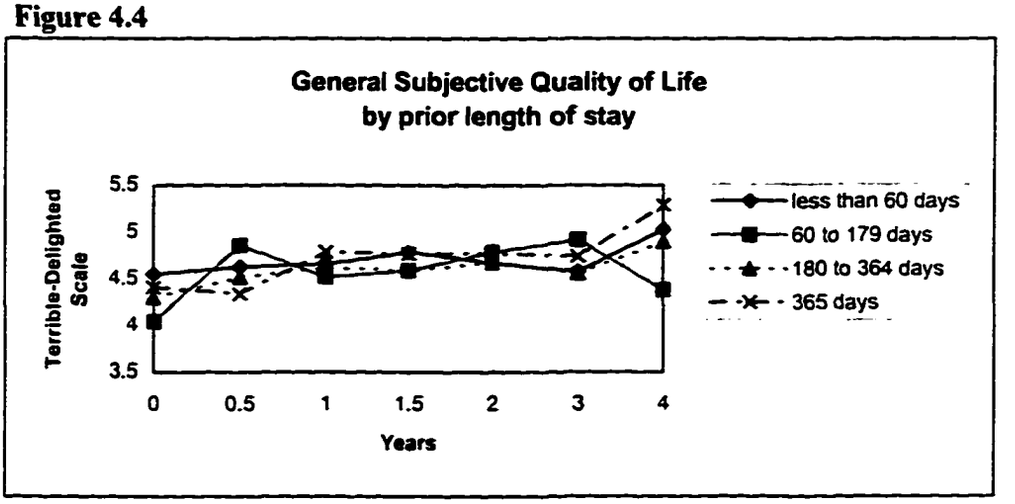


Prior Length of Stay

Another salient dimension to investigate in relation to change in quality of life over time is client history of inpatient psychiatric stay in the year prior to program entry. For the purpose of graphical display, individuals have been classified into one of four groups: (1) less than 60 day stay, (2) 60-179 days, (3) 180-364 days and (4) 365 days. The graph reveals that there is not much difference in the level of quality of life or trends between group 3 and group 4. It may be that individuals in the hospital six months or longer have more in common than either the short stay group (1) or the moderate stay group (2). As expected, the short stay group starts off with the highest level of quality of life at program entry and improves gradually through one and a half years in the program.

At this point, there is a slight dip in quality of life until somewhere between the third and fourth year of the program when the trajectory again increases in a positive direction. The moderate stay group starts off and ends up with the poorest general quality of life. An initial sharp increase in quality of life in the moderate stay group within the first six months is promptly reduced in the next six months of program participation. A large drop-off occurs after year three in the program. Again, since other salient covariates are not included in these graphical displays, caution should be employed when interpreting these figures. However, the erratic trend in the quality of life trajectory for the moderate stay group may suggest a more unstable population group, not easily defined as either short-stayers or long-stayers.

Figure 4.4

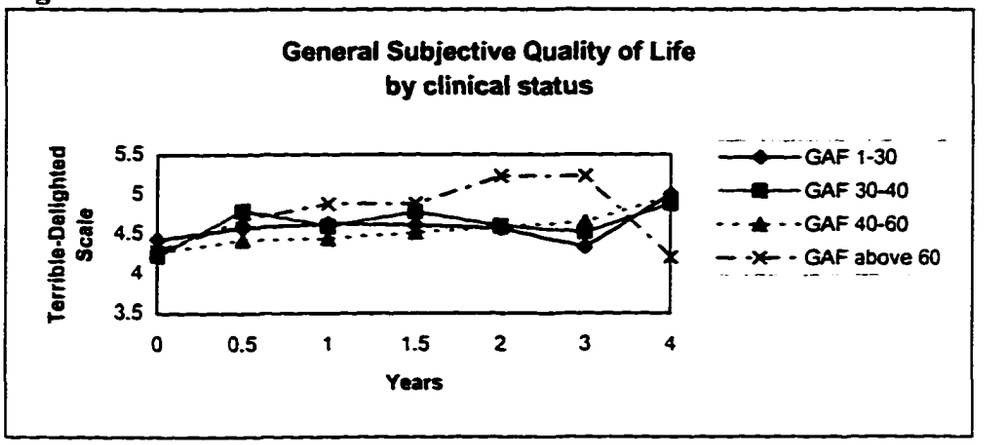


Clinical Status

Figure 4.5 displays the quality of life trajectories for four different groups based on clinical status as follows: (1) GAF 1-30, (2) GAF 30-40, (3) GAF 40-60, (4) GAF above 60. A higher GAF score indicates higher functioning. Interestingly, all four groups start off near the same level of quality of life at program entry. It is the highest functioning group (4) that displays the greatest improvement in quality of life over time.

The third to fourth year drop in quality of life in the highest functioning group may tend to show a group of high functioning patients who remain in the treatment program past three years due to other psycho-social deficiencies or lack of social support. Thus, again, it is difficult to know from this graph alone why a drop-off occurs in quality of life for the high functioning group after year three. This association between functional status and quality of life strongly suggests it will be an important factor in subsequent analyses.

Figure 4.5

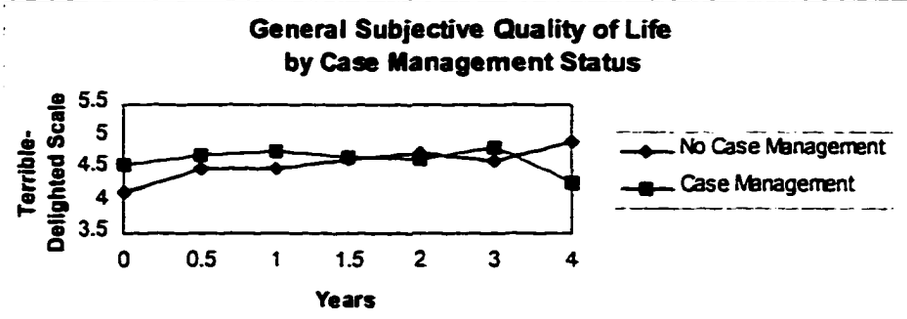


Case Management

Figure 4.6 displays the quality of life trajectory over time for individuals receiving case management at any given time point compared to those not receiving case management at any given time point. The graph suggests that individuals receiving case management services at program entry start-out at a higher level of quality of life and, on the whole, maintain this higher level until the third year of the program, at which time their quality of life declines. This drop-off effect could be accounted for by a variety of other factors. For example, perhaps individuals requiring case management services after three years of treatment program participation, are having a particularly difficult time obtaining needed resources or acquiring the important social and vocational skills needed for community integration. Although the individuals not receiving case management at

the time of program entry start off with a lower level of quality of life, over time, individuals not receiving case management services appear to experience a rather steady increase in quality of life. This case management effect will be thoroughly investigated at the analytic stage.

Figure 4.6



Summary

In this chapter I have described aspects of the person and their treatment program that are related to quality of life. Clearly, this chapter provides some evidence that quality of life is related to clinical functioning, case management, socio-economic status as well as other salient dimensions. I also know that general quality of life changes significantly over time and that these changes appear to be related to treatment program type, psychiatric diagnosis, prior length of stay, clinical status and case management exposure. Given the level of impairment in the population under study, I might not expect significant improvement in clinical symptoms or functioning over time. It is particularly encouraging to know that these clients do indeed improve in their overall quality of life over time. The next challenge is to understand what aspects of the treatment environment might account for some of this improvement in quality of life.

While I know more about the particular characteristics of the treatment program participants and their level of quality of life, I know relatively little about why certain individuals experience a lesser quality of life than others. In the next chapter I explicitly test the hypotheses proposed earlier in a multilevel analysis. In review, I want to investigate to what extent quality of life is determined by client characteristics such as clinical functioning and history of inpatient stay as opposed to treatment characteristics such as case management exposure and treatment program orientation. I also want to investigate the interaction between client and program level characteristics. For example, do persons with schizophrenia do better in terms of quality of life in STAR programs as opposed to IPCC or DTC programs? The results of the multilevel analysis should provide us with a more complete understanding of the effect of personal and environmental characteristics and the interaction between these characteristics on client well-being and social integration.

CHAPTER V

ANALYTIC RESULTS

This chapter provides a systematic review of the results of the multilevel analyses performed on the subjective and objective quality of life scales which measure well-being and degree of social integration across a variety of domain areas. Multilevel analyses typically proceed in the following order: (1) intra-class correlation, (2) first level model, (3) second level model and (4) final model. Accordingly, this chapter begins with presentation of the results of the initial intra-class correlation analyses. Subsequent results are presented in order of level, beginning with time level main effects followed by time level interaction effects, individual level main effects, individual level interaction effects, program level main effects and program level interaction effects. Finally, the full models incorporating all three levels of analysis are discussed. A common model is provided to highlight the different patterns of significant main effects across the eight quality of life domains. The chapter is concluded by discussing outstanding issues such as the implications of remaining variance between individuals and between programs on quality of life.

Review of Hypotheses in a Multilevel Framework

Table 5.1 provides a summary of the hypotheses to be tested using multilevel modeling techniques. Each hypothesis corresponds to a random component included in the statistical analysis as indicated at the far right of the table. For example, the first hypothesis (H1a) proposes that psychiatric diagnosis will affect quality of life. The table

Table 5.1: Hypotheses in relation to multilevel analyses of quality of life (QOL)

Hypotheses	Variable(s)	Level(s)	Effect Modeled	Random Component
Main Effects				
H1a	Psychiatric Diagnosis	individual	effect at individual level on random component	intercept and years random
H1b	Clinical Functioning	time	effect at time level on dependent variable (QOL)	quality of life at time level
H1c	Institutional Stay	individual	effect at individual level on random component	intercept and years random
H2	Case Management (CM)	time	effect at time level on dependent variable (QOL)	quality of life at time level
H3a	STAR Program (STAR)	program	effect at program level on random component	intercept and years random
H3b	DTC Program (DTC)	program	effect at program level on random component	intercept and years random
Moderation Effects				
H4a	CM and Diagnosis	time and individual	cross-level effect on random component	CM-QOL slope random
H4b	CM and Functioning	time	product term at time level: CM x Functioning	quality of life at time level
H4c	CM and Institutional Stay	time and individual	cross-level effect on random component	CM-QOL slope random
H5a	STAR and Diagnosis	program and individual	cross-level effect on random component	Diagnosis-QOL slope random
H5b	DTC and Diagnosis	program and individual	cross-level effect on random component	Diagnosis-QOL slope random
H5c	STAR and Functioning	program and time	cross-level effect on random component	Functioning-QOL slope random
H5d	DTC and Functioning	program and time	cross-level effect on random component	Functioning-QOL slope random
H5e	STAR and Institutional Stay	program and individual	cross-level effect on random component	Stay-QOL slope random
H5f	DTC and Institutional Stay	program and individual	cross-level effect on random component	Stay-QOL slope random

indicates that this variable (psychiatric diagnosis) is measured at the *individual level* of analysis. Therefore, I will test the effect of psychiatric diagnosis on the *individual-level* variance in quality of life between individual clients. The quality of life intercept and years-quality of life slope are treated as random components. In other words, I will model the effect of psychiatric diagnosis on quality of life at program entry (intercept) and change in quality of life over time (years). Not only will I model the direct effect of psychiatric diagnosis on quality of life, but the moderating effect of treatment program orientation on the relationship between psychiatric diagnosis and quality of life. The proposed moderating effect of STAR and DTC programs on the diagnosis-quality of life relationship is represented by hypotheses H5a and H5b. As indicated in table 5.1, these hypotheses represent cross-level effects between the program and individual levels of analyses. The random component modeled is the diagnosis-quality of life slope, or the relationship between psychiatric diagnosis and quality of life. Similarly, all remaining main and moderation effects are represented in table 5.1 in relation to the corresponding hypotheses, variables, levels of analysis, effects modeled and random components. This table provides an overview of the effects to be tested in the multilevel analysis. Next, I describe the steps involved in conducting a multilevel analysis along with results in the following order: intraclass correlation; first-level analysis (*time*); second-level analysis (*time and individual*); third-level analysis or full multilevel model (*time, individual and program*).

Intraclass Correlation

First, an 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: within individual, between individual and between program.

The general formula for the ICC is as follows:

```
Level-1 Model

        Y = P0 + P1*(YEARS) + E

Level-2 Model

        P0 = B00 + R0
        P1 = B10 + R1


Level-3 Model

        B00 = G000 + U0
        B10 = G100 + U1
```

Essentially, no predictor variables are included in the initial model in order to calculate the degree of similarity that exists in quality of life among group members and across time for any given group member. Table 5.2 summarizes the results of the intraclass correlation across all domains of both the subjective and objective quality of life variables. The total variance in quality of life is partitioned into its within individual (*over time*), between individual and between treatment program components. The proportion of variance within individual indicates the proportion of variance in quality of life over time. For example, table 5.2 indicates that over 50% of the variance in the objective finances, housing and leisure quality of life domains is at the within individual level. In other words, the average client's assessed financial and housing situation as well as engagement in leisure activities varies considerably over time. Most of the variance in these quality of life domains (objective finances, housing and leisure) resides at the time level (within-individual) of analysis.

Table 5.2 also indicates that there is a considerable amount of difference between each domain area in terms of the degree of variance attributable to the individual and program levels. The objective health and social domains display the largest proportion of variance in quality of life between treatment programs (10 and 20% respectively) compared to the remaining quality of life domain areas. There is a more even distribution

Table 5.2 Intraclass correlation: Total variance in dependent variables partitioned among three levels: within individual, between individual, between program

Quality of Life Domain Areas	Total Variance	Over Time, Within Individual	Between Individuals	Between Programs
Objective Dimension				
Family	1.227	26.76%	65.14%	8.10%
Finances	3.13	61.00%	30.09%	8.91%
Health	0.649	34.12%	55.35%	10.52%
Housing	0.1	74.62%	18.45%	6.93%
Leisure	9.785	50.34%	45.60%	4.06%
Safety	0.126	44.93%	51.46%	3.61%
Social	0.87	34.91%	44.56%	20.53%
Subjective Dimension				
Family	1.705	38.80%	60.10%	1.10%
Finances	2.155	67.20%	27.10%	5.70%
General	2.207	37.80%	56.30%	5.80%
Health	1.054	38.70%	56.60%	4.70%
Housing	1.309	45.30%	50.70%	4.00%
Leisure	1.183	43.60%	50.00%	6.40%
Safety	1.302	38.10%	55.60%	6.40%
Social	1.029	44.30%	52.60%	3.10%

analysis. Where there is considerable variance in the dependent variable by treatment program, for example, the objective social domain, I might expect program level attributes to explain a significant amount of the variance in quality of life. Where there is considerable variance in the dependent variable by client, for example, the objective family domain, I might expect individual level attributes to explain a significant amount of the variance in quality of life. Finally, where there is considerable variance in the dependent variable over time (*within individual*), for example, the objective finances domain, I might expect time-varying attributes to explain a significant amount of the variance in quality of life.

Table 5.3 indicates that a significant amount of variance exists between individuals and between programs in the baseline quality of life value (intercept) and change trajectory (years) with few exceptions. The change trajectory (years) for the following four domain areas did not significantly vary between programs: objective safety and subjective family, health and social. However, the change trajectory in these same domain areas did vary significantly between individuals. This finding suggests that change in quality of life over time is affected by client characteristics but not by treatment program characteristics. The remaining non-significant variance component, subjective financial domain, suggests that change in financial well-being over time does not differ significantly between treatment programs. All remaining variance components display significant between individual and between program variance in quality of life at program entry and change over time. These results strongly support the exploration of a three-level model to explain variance in quality of life at the three measured levels: within individual (*time*), individual and program.

Table 5.3 Intraclass Correlation: Significant variance between individuals and between programs: intercept and slope (years) variance

Quality of Life Domain Areas	Intercept variance between individuals	Intercept variance between programs	Years variance between individuals	Years variance between programs
Objective Dimension				
Family	***	***	***	***
Finances	***	***	**	***
Health	***	***	***	***
Housing	***	***	***	***
Leisure	***	***	***	*
Safety	***	***	***	ns
Social	***	***	***	***
Subjective Dimension				
Family	***	*	***	ns
Finances	***	***	ns	***
General	***	***	***	***
Health	***	***	***	ns
Housing	***	***	***	*
Leisure	***	***	***	***
Safety	***	***	***	***
Social	***	***	***	ns

ns=not significant

*** p <or= .001, ** p <or= .01, * p<or=.05.

Time Level Model

The time level model incorporates time-varying functional status and case management exposure as well as time itself (years). First, I tested whether the relationship between case management and quality of life varied significantly by individual and by program. Table 5.4 provides a summary of the findings related to the main and random effects of case management on each quality of life domain by objective and subjective dimensions.

Table 5.4: Main and Random Effects of Case Management ($p \leq .05$)

	Subjective Domain		Objective Dimension	
Domain	**Main**	**Random**	**Main**	**Random**
Family	ns	sig	ns	sig
Finances	ns	ns	ns	ns
General	sig	ns	Not Applicable	
Health	sig	ns	ns	ns
Housing	ns	sig	sig	ns
Leisure	sig	ns	sig	ns
Safety	ns	ns	ns	ns
Social	sig	ns	sig	ns

Main Effect

Case management displays a significant ($p \leq .05$) main effect on the following quality of life domains: subjective general, health, leisure, social and objective housing, leisure and social. Being in case management appears to improve general well-being as

well as satisfaction with health, leisure and social areas. Additionally, case management may improve access to adequate housing resources and facilitate engagement in leisure and social activities. Although case management was not a significant factor across all quality of life domain areas, it will be included as a main effect in all subsequent models for the purpose of clarity and comparison across domain areas.

Random Effect

The effect of case management on the dependent variable varied significantly across individuals ($p \leq .05$) for the following quality of life domains: subjective and objective family and subjective housing. However, the main effect of case management for these same domains was not significant ($p > .05$). In other words, while the relationship between case management and quality of life does vary significantly across individuals, case management itself does not significantly predict quality of life related to family relations nor well-being related to housing. Therefore, case management will be treated as a fixed effect across all dependent variables between individuals. The effect of case management will be set to the average effect across individuals within each group for modeling purposes.

Time Level Interactions

Next, I tested whether the interaction between functional status and case management had any effect on quality of life. Table 5.5 details the interaction between case management and clinical functioning (as measured by GAF) on quality of life. As displayed in table 5.5 there is relatively weak support for hypothesis H4b related to the interaction between case management and functional status on quality of life. Even though there are relatively few significant interaction effects between case management and clinical functioning (as measured by GAF), this does not mean that clinical functioning is not an important factor in the relationship between case management and

Table 5.5: Main Effects of Case Management and Interaction between Clinical Functioning (as measured by GAF) and Case Management (p≤.05)

	Subjective Domain		Objective Dimension	
Domain	**CM**	**CM X GAF**	**CM**	**CM x GAF**
Family	ns	ns	ns	ns
Finances	sig	sig	ns	ns
General	ns	ns	Not Applicable	
Health	ns	ns	ns	ns
Housing	ns	ns	sig	ns
Leisure	ns	ns	ns	sig
Safety	ns	ns	ns	ns
Social	ns	ns	sig	sig

quality of life. There are likely a confluence of factors that determine why one person receives case management and not another one. These factors are probably not captured well in a single measure of clinical functioning. The relationship between case management and clinical functioning is variable depending on the quality of life domain investigated and the clinical functioning measure used. Furthermore, and perhaps more importantly, without functional status in the models, case management varies significantly across most domains of quality of life. However, with functional status in the models, case management no longer varies significantly across these same domains. These results certainly suggest an interaction effect, but this effect could be a three-way interaction between program, case management status and functional status. In other

words, some programs may provide case management services designed for functionally well-off or worse-off client groups which result in differential outcomes in terms of quality of life. These potentially significant three-way interactions will not be tested here. Rather than dismiss the importance of functional status, further investigation is needed.

Time Level Random Effects

Based on the above investigation of case management, it will be treated as a fixed variable at the individual level of analysis. Additionally, the interaction between case management and functional status will not be incorporated in the fuller models due to the rather weak support exhibited in this interaction effect. In preparation for testing the effect of treatment program type on the relationship between functional status and quality of life, functional status will be treated as a random variable. Accordingly, the final time level models treat case management as a fixed effect and clinical functioning as a random effect.

Final Time Level Models

The equation format for the final time level model is as follows:

Level-1 Model

$$Y = P0 + P1*(CURRGAF) + P2*(CMCAT) + P3*(YEARS) + E$$

Level-2 Model

$$P0 = B00 + R0$$

$$P1 = B10 + R1$$

$$P2 = B20$$

$$P3 = B30$$

```
Level-3 Model

        B00 = G000 + U0

        B10 = G100 + U1

        B20 = G200

        B30 = G300
```

Clinical Functioning (GAF) Random Effects - Summary

Table 5.6 provides a summary of the clinical functioning effect and whether it significantly varies at the individual and program levels based on the chi square statistic ($p \leq .05$). The effect will be treated as a fixed as opposed to random effect where it does not vary significantly. For example, at the program level of analysis, the effect of clinical functioning on quality of life will be treated as a fixed effect for the following domain areas: subjective family, general, health, leisure and safety and objective family, housing, and leisure. In other words, the relationship between clinical functioning and quality of life did not vary across treatment programs on these domain areas. Therefore, I treat these relationships as common (or *fixed*) effects across treatment programs.

Tables 5.7 and 5.8 display the results of the final time level models for the objective and subjective domains, respectively. Consistently, functional status is a significant predictor of quality of life across a variety of domain areas, with few exceptions. Case management is significantly associated with quality of life in the family, housing, leisure and social domains across both the subjective and objective dimensions controlling for a variety of other factors including functional status.

Table 5.6: Random Effects of Clinical Functioning (p≤.05)

	Subjective Domain		Objective Dimension	
Domain	**Individual**	**Program**	**Individual**	**Program**
Family	sig	ns	sig	ns
Finances	sig	sig	ns	sig
General	sig	ns	Not Applicable	
Health	sig	ns	ns	sig
Housing	sig	sig	sig	ns
Leisure	sig	ns	sig	ns
Safety	sig	ns	sig	sig
Social	ns	sig	ns	sig

Additionally, case management is associated with general well-being and satisfaction with health status and health services. The passage of time itself is related to improvement in quality of life across most domain areas. Note, however, that these models do not control for covariates at the individual and program levels of analysis. The next step in multilevel modeling is to layer in the individual level predictor variables.

Individual Level Models

Tables 5.9 and 5.10 summarize the results of the individual level models for the objective and subjective quality of life dimensions. These individual level models incorporate both time level and individual level covariates. The time-level covariates, case management and functional status continue to display significant effects on several

Table 5.7: Final Time Level Model for Objective Quality of Life Domains

Predictor	Family	Finance	Health	Housing	Leisure	Safety	Social
Time Level							
Years	-.057***	.498***	.031***	-.015**	ns	.018***	ns
Functioning	ns	.013*	.008***	ns	.025***	ns	.006**
Case Management	.084*	ns	ns	-.046**	.426**	ns	.149***

ns=not significant
*** p <or= .001, ** p <or= .01, * p<or=.05.

Table 5.8: Final Time Level Model for Subjective Quality of Life Domains

Predictor	Family	Finance	General	Health	Housing	Leisure	Safety	Social
Time Level								
Years	ns	.443***	.079***	ns	.047***	.039***	-.024*	ns
Functioning	.007**	.014**	.008*	.006***	.013***	.013***	.007**	.010***
Case Management	.096*	ns	.187***	.136***	.114*	.094*	ns	.086*

ns=not significant
*** p <or= .001, ** p <or= .01, * p<or=.05.

quality of life domain areas in both the objective and subjective dimensions. Relatively weak support was found for the individual level covariates related to the subjective quality of life dimension, although individuals with a diagnosis of schizophrenia displayed significantly higher ratings of quality of life in the following well-being domains: finance, general, health, leisure and social. The individual level effects were stronger for the objective quality of life domains. As age increases, objectively measured quality of life in the following domain areas decreases: family, leisure and social. The results of the individual level models indicate that different patterns emerge for each domain area of quality of life. The final step in multilevel modeling is to layer-in the treatment program covariates into the model.

Final Full Multilevel Models

Tables 5.11 and 5.12 summarize the results of the full models for the objective and subjective dimensions of quality of life respectively. Essentially, these final multilevel models represent a common saturated model for the purpose of comparing models across each unique dependent variable. The final multilevel models reveal a pattern of explanatory differences among each objective and subjective quality of life domain area. At the time level, the passage of time itself is positively related to improvement in objective financial status and financial well-being, satisfaction with housing and overall objectively-measured safety. Often, gaining access to federal resources such as SSI takes a considerable amount of time. Program staff may be able to assist clients in obtaining financial assistance over time. Additionally, these clients are transitioning from an inpatient to outpatient setting. Previous studies have almost consistently demonstrated an improvement in satisfaction with housing as clients move from an inpatient to an outpatient setting. While these domain areas exhibit positive associations with time, degree of contact with family declines over time. It may be that the longer an individual remains in the treatment program, the more difficult it is for the

Table 5.9: Final Individual Level Model for Objective Quality of Life Domains

Predictor	Family	Finance	Health	Housing	Leisure	Safety	Social
Time Level							
Years	-.061***	.507***	ns	ns	ns	.017***	ns
Functioning (GAF)	.003*	.018**	.008***	ns	.023***	ns	.005***
Case Management	ns	ns	ns	-.042*	.391**	ns	.138***
Individual Level - Effects on Baseline Quality of Life							
Socio-Demographic							
Age	-.012***	ns	ns	ns	-.039***	ns	-.006**
Male	ns	ns	ns	ns	ns	ns	-.371***
Marry	.241*	ns	ns	.063*	ns	ns	ns
White	ns	ns	-.146*	ns	-.742**	ns	ns
Socio-Economic							
Education	.045***	ns	ns	ns	.138***	ns	.033***
Job	ns	-.480***	ns	ns	ns	ns	ns
Income	.103***	.171***	-.045*	ns	.379***	-.037***	.115***
Psychiatric Profile							
Institutional Stay	ns	ns	ns	ns	ns	ns	-.0005*
Schizophrenia	-.247*	ns	ns	ns	ns	ns	ns
Individual Level - Effects on Change in Quality of Life over time							
Socio-Demographic							
Age	ns	.004*	ns	ns	ns	ns	ns
Male	ns	ns	ns	ns	ns	ns	.139*
Marry	ns	ns	ns	ns	ns	ns	ns
White	ns	ns	ns	ns	.259*	ns	ns
Socio-Economic							
Education	ns	ns	ns	ns	ns	ns	ns
Job	ns	ns	ns	ns	ns	ns	ns
Income	ns	-.057**	.029***	ns	ns	.013**	-.045***
Psychiatric Profile							
Institutional Stay	ns	-.0005*	ns	ns	ns	ns	ns
Schizophrenia	.094*	ns	ns	ns	ns	ns	ns

ns=not significant; *** p <or= .001, ** p <or= .01, * p<or=.05.

Table 5.10: Final Individual Level Model for Subjective Quality of Life Domains

Predictor	Family	Finance	General	Health	Housing	Leisure	Safety	Social
Time Level								
Years	ns	.447***	.080**	.006***	.047**	ns	ns	ns
Functioning (GAF)	.006***	.016**	.008***	.138***	.013***	.011***	.007***	.010***
Case Management	ns	ns	.154**	ns	.089*	.087*	ns	.089*
Individual Level - Effects on Baseline Quality of Life								
Socio-Demographic								
Age	ns	-.008**	ns	ns	ns	ns	ns	ns
Male	.348*	ns	ns	ns	ns	ns	ns	ns
Marry	ns	ns	ns	ns	ns	ns	ns	ns
White	ns	ns	ns	ns	ns	ns	ns	ns
Socio-Economic								
Education	ns	ns	ns	ns	ns	ns	ns	ns
Job	ns	ns	ns	ns	ns	ns	ns	ns
Income	ns	ns	ns	-.075**	ns	ns	-.093***	ns
Psychiatric Profile								
Institutional Stay	ns	ns	ns	ns	ns	ns	ns	ns
Schizophrenia	ns	.240*	.395**	.205*	ns	.226**	ns	.196*
Individual Level - Effects on Change in Quality of Life over time								
Socio-Demographic								
Age	ns	.004**	ns	ns	ns	ns	ns	ns
Male	ns	-.222**	ns	ns	ns	ns	ns	ns
Marry	ns	ns	ns	ns	ns	ns	ns	ns
White	ns	ns	.111*	ns	ns	ns	ns	ns
Socio-Economic								
Education	ns	ns	ns	ns	ns	ns	ns	ns
Job	ns	ns	ns	ns	ns	ns	ns	ns
Income	ns	ns	ns	.027**	ns	ns	.024*	ns
Psychiatric Profile								
Institutional Stay	ns	ns	ns	ns	ns	ns	ns	ns
Schizophrenia	.094*	ns	ns	ns	ns	ns	ns	ns

ns=not significant; *** p <or= .001, ** p <or= .01, * p<or=.05.

individual to maintain family contact.

Also at the time level, functional status as measured by GAF displays a fairly consistent positive relationship with quality of life improvement across the following domain areas: objectively and subjectively measured housing, leisure and social quality of life and general well-being and satisfaction with health and health services. As functional status improves, so does quality of life across several domain areas.

Additionally, case management status is positively related to the leisure and social quality of life domains as measured subjectively and objectively. Perhaps case managers are able to steer clients toward leisure and social activities thus improving not only their engagement in the activity, but their satisfaction with this engagement. Individuals receiving case management services also display an improved overall well-being and satisfaction with health and health services and housing. Although these areas did not indicate an improvement as objectively measured, it may be that the attention of the case managers to health and housing issues positively affects the client's satisfaction in these areas. It should be noted that the objectively measured housing domain actually declined for individuals receiving case management services.

At the individual level of analysis, the results of the final model are more mixed. The first set of results at the individual level as contained in tables 5.11 and 5.12 displays the effects of individual level covariates on baseline quality of life at program entry (effects on intercept). The second set displays the individual predictor effects on change in quality of life over time (effects on years slope). These results will be presented by broad profile groups as follows: socio-demographic, socio-economic and psychiatric profile.

Table 5.11: Final Full Model for Objective Quality of Life Domains

Predictor	Family	Finance	Health	Housing	Leisure	Safety	Social
Time Level							
Years	-.061***	.489***	ns	ns	ns	.017***	ns
Functioning (GAF)	.003*	.023***	ns	ns	.023***	.003*	.005***
Case Management	ns	ns	ns	-.040*	.390***	ns	.138***
Individual Level - Effects on Baseline Quality of Life							
Socio-Demographic							
Age	-.013***	ns	ns	ns	-.039***	ns	-.005**
Male	ns	ns	ns	ns	ns	ns	-.370***
Marry	.242*	ns	ns	.064*	ns	ns	ns
White	ns	ns	-.148*	ns	-.741**	ns	ns
Socio-Economic							
Education	.045***	ns	ns	ns	.138***	ns	.033***
Job	ns	-.478***	ns	ns	ns	ns	ns
Income	.103***	.173***	-.045*	ns	.380***	-.037***	.115***
Psychiatric Profile							
Institutional Stay	ns	ns	ns	ns	ns	ns	-.0005*
Schizophrenia	ns	ns	ns	ns	ns	ns	ns
Individual Level - Effects on Change in Quality of Life over time							
Socio-Demographic							
Age	ns	.004*	ns	ns	ns	ns	ns
Male	ns	ns	ns	ns	ns	ns	.139**
Marry	ns	ns	ns	ns	ns	ns	ns
White	ns	ns	ns	ns	.258*	ns	ns
Socio-Economic							
Education	ns	ns	ns	ns	ns	ns	ns
Job	ns	ns	ns	ns	ns	ns	ns
Income	ns	-.059**	ns	ns	ns	.013**	-.045***
Psychiatric Profile							
Institutional Stay	ns	-.0005*	ns	ns	ns	ns	ns
Schizophrenia	.094*	ns	ns	ns	ns	ns	ns
Program Level - Effects on Baseline Quality of Life							
STAR	ns	ns	ns	ns	ns	ns	ns
DTC	ns	ns	ns	-.136**	ns	ns	ns
IPCC	ns	ns	ns	ns	ns	ns	ns

ns=not significant; *** p <or= .001, ** p <or= .01, * p<or=.05.

Table 5.12: Final Full Model for Subjective Quality of Life Domains

Predictor	Family	Finance	General	Health	Housing	Leisure	Safety	Social
Time Level								
Years	ns	.609***	ns	ns	.047**	ns	ns	ns
Functioning (GAF)	.006***	ns	.008***	.006***	ns	.011***	.007***	.005***
Case Management	ns	ns	.147**	.138***	.089*	.093*	ns	.089*
Individual Level - Effects on Baseline Quality of Life								
Socio-Demographic								
Age	ns	-.008**	ns	ns	ns	ns	ns	ns
Male	.347*	ns	ns	ns	ns	ns	ns	ns
Marry	ns	ns	ns	ns	ns	ns	ns	ns
White	ns	ns	ns	ns	ns	ns	ns	ns
Socio-Economic								
Education	ns	ns	ns	ns	ns	ns	ns	ns
Job	ns	ns	ns	ns	ns	ns	ns	ns
Income	ns	ns	ns	-.075**	ns	ns	-.094***	ns
Psychiatric Profile								
Institutional Stay	ns	ns	ns	ns	ns	ns	ns	ns
Schizophrenia	ns	.237*	ns	.205**	ns	.226**	ns	.195*
Individual Level - Effects on Change in Quality of Life over time								
Socio-Demographic								
Age	ns	.004**	ns	ns	ns	ns	ns	ns
Male	ns	-.223*	ns	ns	ns	ns	ns	ns
Marry	ns	ns	ns	ns	ns	ns	ns	ns
White	ns	ns	.112*	ns	ns	ns	ns	ns
Socio-Economic								
Education	ns	ns	ns	ns	ns	ns	ns	ns
Job	ns	ns	ns	ns	ns	ns	ns	ns
Income	ns	ns	ns	.027**	ns	ns	.024*	ns
Psychiatric Profile								
Institutional Stay	ns	ns	ns	ns	ns	ns	ns	ns
Schizophrenia	ns	ns	ns	ns	ns	ns	ns	ns
Program Level - Effects on Change in Quality of Life over time								
STAR	ns	-.222*		ns	ns	ns	ns	ns
DTC	ns	ns		ns	ns	ns	ns	ns
IPCC	ns	ns		ns	ns	ns	ns	ns

ns=not significant; *** p <or= .001, ** p <or= .01, * p<or=.05.

Socio-demographic Profile

At baseline, a client's age was significantly and negatively related to their degree of family relations and engagement in leisure and social activities as well as satisfaction with their financial situation. Males tended to engage in fewer social activities while feeling generally better about their family relations than females. Married individuals tended to have better family relations (likely with their spouses) and housing arrangements than non-married clients. Whites tended to display poorer health status and access to health service resources as well as less engagement in leisure activities than non-whites. This race effect represents an anomalous finding. I would expect whites to display better health status and access to health service resources as well as more engagement in leisure activities based on the general literature on race and social relations. It could be that there are special programs in the VA system that target health care services toward people of color and this might account for the unexpected finding related to race and health care access. However, I do not know that this is the case and, therefore, will not offer any further speculation on this anomalous finding. It certainly warrants further analysis.

Over time, increasing age appeared to improved the client's objectively and subjectively-measured financial situation. Additionally, over time males did appear to engage in more social activities despite their initially lower engagement compared to females. Indeed, this effect tends to show a reduction in the gender gap between men and women in terms of social engagement over time. However, over time males experience declining satisfaction with their financial situation. Over time, whites engage in more leisure activities than non-whites and this, again, may indicate a reduction in the race gap between whites and non-whites related to involvement in leisure activities over time. This race effect related to leisure activity may in turn relate to improved overall well-being among whites over time.

Socio-economic Profile

At baseline, individuals with more formal education have better relations with family members and engagement in more leisure and social activities. Individuals who are currently employed at the time of treatment program enrollment have less access to financial resources for purchasing needed items such as food and clothing. It may be that individuals who are employed have reduced access to government-sponsored income assistance programs which would provide resources for items such as food and clothing. Indeed, the effect of access to financial resources is specifically tested in this analysis. As expected, as access to financial resources improves (number of income sources), so does the ability of the client to obtain resources such as food and clothing. Furthermore, at baseline, individuals with more access to financial resources (income) revealed better family relations and more engagement in social and leisure activities. Interestingly, at baseline, individuals with more financial resource availability experienced a poorer quality of life in the health and safety domain areas across the subjective and objective dimensions.

Over time, however, as access to financial resources improved, clients experienced a decreasing ability to purchase needed items such as food and clothing and a decreasing engagement in social activity. Here, increasing access to financial resources may indicate a client with a variety of dysfunctions (not captured by the GAF measure) enabling them to access a variety of income assistance programs while reducing their ability to engage in social activity and spend money on shopping and social activities. Over time, increasing access to financial resources positively affected satisfaction with health and health services and overall safety as objectively and subjectively measured.

Psychiatric Profile

At baseline, clients with a history of more days of inpatient stay in the past 12 months engaged in less social activity. Surprisingly, individuals with a diagnosis of schizophrenia were more satisfied in the following quality of life domains: finance, health, leisure and social. Over time, clients with a history of longer inpatient stay experienced a decline in their financial status. Also over time, individuals with a diagnosis of schizophrenia improved in their degree of social involvement with family members.

Treatment Program

Finally, at the program level analysis, treatment program orientation as measured by program type (STAR, DTC and IPCC) was a very weak predictor of either baseline quality of life status or improvement in quality of life over time. Persons in Day Treatment Programs tended to indicate access to housing of poorer quality. Perhaps individuals in Day Treatment Programs have less access to structured and supportive housing programs. It may be that more of the DTC program participants reside in Single Room Occupancy (SRO) hotel apartments with poorer living conditions. This should be investigated further. The other significant program type effect was that of STAR programs on satisfaction with one's financial situation over time. Clients in STAR programs tended to show a declining satisfaction with their financial situation over time. This effect also warrants further investigation. Overall, program orientation as measured by treatment program typology is a poor predictor of quality of life. This does not mean that treatment programs do not affect quality of life. It simply means that treatment program type means relatively little in relation to quality of life.

Summary of Findings

Table 5.13 summarizes the percent explanation provided by each multilevel model by domain area. The common final model provided different degrees of explanation across each domain area of quality of life in both the subjective and objective dimensions. The degree of overall explanation ranges from 2.26% (subjective social) to 11.47% (objective leisure) of the total variance in quality of life. Clearly a large proportion of variance in quality of life remains unexplained.

Indeed, table 5.14 indicates that a significant amount of variance in quality of life remains between treatment programs. After including all predictors at all three levels of analysis there remains significant variance in quality of life across all domain areas at program entry between treatment programs. Change in quality of life over time also varies significantly between treatment programs for the following domain areas: subjective finance, general, leisure and safety and objective finance, health and housing. I was unable to explain any portion of the between treatment program variance in these domain areas (*baseline or change*) with the variable treatment program type. It is likely that some other aspect of the treatment program such as staffing arrangement or resource availability is driving these between program differences in quality of life.

Additionally table 5.14 reveals that the relationship between functional status and quality of life varied significantly between programs for several domain areas (subjective finance, housing, social and objective finance, health and safety). This finding suggests that some programs may provide more tailored services for poorer functioning clients in terms of these domain areas. Similarly, the relationship between having a diagnosis of schizophrenia and quality of life varied significantly between treatment programs for several domain areas (general well-being, objective family, health and safety). Again,

Table 5.13: Proportion of Total Variance Explained by Final Model

Quality of Life Domain Areas	Total Initial Variance	Total Final Variance	Proportion of Variance Explained by Final Full Model
Objective Dimension			
Family	1.227	1.168	4.83%
Finances	3.130	3.022	3.45%
Health	0.649	0.621	4.32%
Housing	0.100	0.095	5.29%
Leisure	9.785	8.662	11.47%
Safety	0.126	0.118	6.16%
Social	0.870	0.795	8.64%
Subjective Dimension			
Family	1.705	1.639	3.86%
Finances	2.155	2.105	2.30%
General	2.207	2.092	5.19%
Health	1.054	1.021	3.16%
Housing	1.309	1.242	5.09%
Leisure	1.183	1.100	7.01%
Safety	1.302	1.173	9.94%
Social	1.029	1.006	2.26%

this suggests the differential ability of some programs over others to provide enhanced services for persons with schizophrenia. Clearly, some unmeasured aspect of the treatment program does affect quality of life. In the discussion chapter, I will discuss some potential aspects of the treatment program not measured here that might explain the significant remaining between-program variance in quality of life and the relationship between important covariates (clinical functioning and schizophrenia) and quality of life.

Hypotheses Revisited

Tables 5.15 and 5.16 provide a summary of the findings in relation to each of the tested hypotheses. The effect of primary diagnosis on quality of life was opposite that hypothesized (H1a). Rather than clients with schizophrenia experiencing a poorer quality of life, they indicated higher satisfaction in the following subjective domain areas: finance, health, leisure and social. Strong support was exhibited for the hypothesized effect of functional status on quality of life (H1b). Functional status was positively related to quality of life in the following domain areas: general well-being, satisfaction with health and health services, objectively-measured financial situation and objectively and subjectively-measured family relations, engagement in leisure and social activities and safety. Very weak support was found for the effect of institutional stay on quality of life (H1c). Individuals with a history of longer institutional stay exhibited less engagement in social activities and a poorer financial situation. Relatively strong support was found for the hypothesized effect of case management on quality of life (H2) across the following domain areas: general well-being, satisfaction with health and health services, and objectively and subjectively-measured housing status and engagement in leisure and social activities. As mentioned previously, very weak support was found for the effect of treatment program type on quality of life (H3a and H3b). In the direction hypothesized, DTC program participants tended to show access to poorer quality housing.

Table 5.14: Random Effects at Program Level (Significant at p < or = .05)

Effect	Family	Finance	General	Health	Housing	Leisure	Safety	Social
Subjective Quality of Life								
Baseline quality of life	x	x	x	x	x	x	x	x
Change in quality of life over time		x	x			x	x	
Relationship between functional status and quality of life		x			x			x
Relationship between psychiatric diagnosis and quality of life			x					
Objective Quality of Life								
Baseline quality of life	x	x	n/a	x	x	x	x	x
Change in quality of life over time		x	n/a	x	x			
Relationship between functional status and quality of life		x	n/a	x			x	
Relationship between psychiatric diagnosis and quality of life	x		n/a	x			x	

However, in the opposite direction from that hypothesized, STAR program participants indicated a lower level of satisfaction in the financial domain.

Overall, weak support was found for the hypotheses related to the moderation effects (H4a through H5f). The effect of case management on quality of life did not vary significantly between individuals across most domain areas. When the case management effect did vary significantly between individuals, the effect of case management itself on quality of life was not significant as displayed in table 5.4. Therefore, the hypothesized effects of individual level predictors such as schizophrenia diagnosis (H4a) and Institutional Stay (H4c) were not substantiated. Weak support was found for the interaction between case management and functional status (H4b) as displayed in table 5.5. Where the interaction effect was significant the results were mixed with a positive effect of the interaction between case management and functional status on objectively measured housing quality and engagement in social activities and a negative effect of the interaction between case management and functional status on satisfaction with one's financial situation.

No support was found for the hypotheses related to the interaction effect of program type with diagnosis (H5a and H5b), functional status (H5c and H5d) and institutional stay (H5e and H5f) on quality of life. In fact, the effect of institutional stay on quality of life did not vary significantly between treatment programs, suggesting no effect of treatment program on the relationship between institutional stay and quality of life. In contrast, the effects of diagnosis and functional status did vary significantly between treatment programs for several of the quality of life domains. Specifically, the effect of having a diagnosis of schizophrenia on general well-being and objectively-measured quality of life in the health and safety domains did vary significantly between treatment programs. Although treatment program type did not explain this variance,

Table 5.15: Summary of results of final full model of objective quality of life in relation to hypotheses

Hypotheses	Variable(s)	Family	Finance	Health	Housing	Leisure	Safety	Social
	Main Effects							
h1a	primary diagnosis (dx)							
h1b	functioning	+	+			+	+	+
h1c	institutional stay (stay)							-
h2	case management (cm)				+	+		+
h3a	STAR program							
h3b	DTC program				-			
	Effects on years slope							
h1a	primary diagnosis (dx)	+						
h1c	institutional stay		-					
h3a	STAR program							
h3b	DTC program							
	Moderation Effects							
h4a	cm x dx	Overall limited support of these hypotheses, see table 5.4.						
h4b	cm x functioning	Overall limited support of these hypotheses, see table 5.5.						
h4c	cm x stay	Overall limited support of these hypotheses, see table 5.4.						
h5a	STAR program x dx			A			A	
h5b	DTC program x dx			A			A	
h5c	STAR x functioning		B	B			B	
h5d	DTC x functioning		B	B			B	
h5e	STAR x stay	The relationship between inpatient stay and quality of life did not vary significantly by progra						
h5f	DTC x stay	The relationship between inpatient stay and quality of life did not vary significantly by progra						

A = indicates that relationship between Schizophrenia and quality of life varies significantly by program, this variance is not explained by program type however.

B = indicates that relationship between functional status and quality of life varies significantly by program, this variance is not explained by program type however.

Table 5.16: Summary of results of final full model of subjective quality of life in relation to hypotheses

Hypotheses	Variable(s)	Family	Finance	General	Health	Housing	Leisure	Safety	Social
	Main Effects								
h1a	primary diagnosis (dx)		+		+		+		+
h1b	functioning	+		+	+		+	+	+
h1c	institutional stay (stay)								
h2	case management (cm)			+	+	+	+		+
h3a	STAR program		-						
h3b	DTC program								
	Effects on years slope								
h1a	primary diagnosis								
h1c	institutional stay								
h3a	STAR program		-						
h3b	DTC program								
	Moderation Effects								
h4a	cm x dx	Overall limited support of these hypotheses, see table 5.4.							
h4b	cm x functioning	Overall limited support of these hypotheses, see table 5.5.							
h4c	cm x stay	Overall limited support of these hypotheses, see table 5.4.							
h5a	STAR program x dx			A					
h5b	DTC program x dx			A					
h5c	STAR x functioning		B			B			B
h5d	DTC x functioning		B			B			B
h5e	STAR x stay	The relationship between inpatient stay and quality of life did not vary significantly by program.							
h5f	DTC x stay	The relationship between inpatient stay and quality of life did not vary significantly by program.							

A = indicates that relationship between Schizophrenia and quality of life varies significantly by program, this variance is not explained by program type however.

B = indicates that relationship between functional status and quality of life varies significantly by program, this variance is not explained by program type however.

some other program level covariate not included in these models may possess some power in explaining variance in the relationship between diagnosis and quality of life by treatment program. Similarly, the effect of functional status on quality of life varied significantly by treatment program for the following quality of life domain areas: objective finance, health, safety and subjective finance, social and housing. These findings strongly suggest an important moderating effect of treatment program on therelationship between functional status and quality of life. Again, although treatment program type was not a significant predictor of the relationship between functional status and quality of life, some other factor at the treatment program level likely affects this relationship.

Overall, these models reveal relatively strong support for the hypothesized time level effects, less support for the hypothesized individual level effects and little to no support for the hypothesized program level and moderation effects. The theoretical and methodological implications of this analysis will be discussed in more detail in the next chapter.

CHAPTER VI

DISCUSSION

In this chapter I discuss the theoretical and methodological implications of this study. This dissertation focused on changes in quality of life over time in a group of veterans with serious mental illness. I used an ecological perspective to determine which elements of the individual and/or their environment affect different aspects of quality of life. In specific, the study investigated the extent to which quality of life is related to such environmental contingencies as case management provision taking into account such client limitations and strengths as clinical functioning.

Central Research Questions Revisited

This study sought to answer five central research questions. A brief summary of the findings related to each of these research questions follows.

How do different aspects of the client's psychiatric profile impact quality of life?

The client's psychiatric profile (functional status, history of inpatient stay and psychiatric diagnosis) does impact quality of life. Functional status is strongly associated with the following domain areas: objectively and subjectively measured housing, leisure and social quality of life, general well-being and, satisfaction with health and health

services. As functional status improves, so does quality of life across several domain areas. Individuals who are able to function better are likely to have better access to needed resources and greater involvement in leisure and social activities.

In addition, clients with a diagnosis of schizophrenia display greater satisfaction in terms of their health, financial situation, and engagement in leisure and social activities than clients with a non-schizophrenic diagnosis. Since schizophrenics represent the majority diagnostic grouping in these VA programs, it may be that these programs are oriented toward treating schizophrenia. However, some programs are meeting the quality of life needs of schizophrenics to a greater extent than other programs. I discuss this later, in relation to the program moderation research question.

The client's history of length of inpatient stay did has no measurable impact on quality of life. However, these clients had rather similar histories of inpatient stay in order to be included in the study. Some other measure of chronicity or institutional dependence may relate more strongly to quality of life over time than the one available to me in these data. For example, perhaps the *number* of psychiatric admissions in the past year or *cumulative* lifetime psychiatric inpatient stay (adjusted for the client's age) would reflect institutional dependence more accurately.

How does case management exposure influence quality of life?
How does case management moderate the effect of different aspects of the client's psychiatric profile on quality of life?

The provision of case management services is related to several domains in both the objective and subjective dimensions of quality of life. For example, case management is positively related to clients' leisure and social quality of life domains, as

measured both subjectively and objectively. Perhaps case managers are able to steer clients toward leisure and social activities, thus improving not only their engagement in these activities, but their satisfaction with this engagement. In other words, individuals receiving case management express more involvement in leisure and social activities. This increased social engagement might improve the client's satisfaction level about their own involvement in social and leisure activities.

Furthermore, individuals receiving case management services also show improvement in overall well-being and satisfaction with health and health services. There is no objective complement to the general well-being measure, however, access to health services did not improve for individuals in case management. There is an association between being in case management and satisfaction with health, but not with objectively measured health access. It may be that the attention of the case manager to health issues encourages the clients to feel better about their overall health status while not improving actual access to health care services. This issue is of particular interest here because the population studied is situated with the Veteran's health care system. One would expect that veterans receiving case management might have better access to health care services, particularly when their care is coordinated by case managers working in VA hospitals and associated clinics. However, my findings indicate that veterans with serious mental illness who are in case management have equal access to health care resources as individuals not receiving case management, all else being equal. Clearly, the relationship between case management and health care access should be investigate more fully.

Another potential contradictory finding is the relationship between case management exposure and the client's overall satisfaction with his or her housing arrangement and objectively-measured housing quality. While case managed individuals'

satisfaction with housing improved, the objectively measured housing domain declined for these same individuals. One explanation is that I am measuring associations between case management and quality of life, without clearly testing the causal order of these relationships. In other words, it may not be that case management affects housing quality or that the case manager steers the client toward poor housing. But, rather, that individuals in poor housing require more case management. These causal mechanisms are not tested here, but could be explored in a future analysis using an appropriate method such as structural equation modeling. This same issue of causality could be raised related to many of the findings discussed in this paper.

The relationship between case management and quality of life does not vary significantly between individual clients. Therefore, the hypothesized moderation effects of case management on the relationship between the psychiatric profile variables and quality of life were not supported.

How do programs oriented toward structured support influence quality of life? How do programs oriented toward structured support moderate the effect of different aspects of the client's psychiatric profile on quality of life?

Finally, treatment program type was not related to quality of life on the whole. However, because there is significant variance in quality of life between treatment programs, there is something of importance about the treatment program other than program typology that relates to quality of life. These findings suggest that the measures of program type used here are weak measures of program orientation. The program type measures simply indicate in which type (STAR, DTC or IPCC) of treatment program the client is enrolled. The lack of a significant effect of program type on between-program variation in quality of life indicates that the type of program a client is in has no

relationship with quality of life, all else being equal. In addition to the overall between program variance in quality of life, the relationship between two psychiatric profile variables (functional status and schizophrenia diagnosis) and quality of life varies significantly between treatment programs. Therefore, although treatment program type did not explain variation between treatment programs, some other aspect about the treatment program not tested here may explain why some programs appear better suited for low functioning patients and those with schizophrenia. For example, some programs may be designed particularly to address the needs of lower functioning patients by providing uniquely tailored social skills training and sheltered vocational workshops. Differences at the treatment program level in terms of services provided and contact with patients may help explain these between program differences in quality of life. The next section discusses some recent data on treatment program variability and how it might relate to the quality of life of the U.S. veteran with serious mental illness.

Treatment Program Variability

Recent data[iv], not available when the empirical portion of this study was conducted, suggests that there is considerable variation among treatment programs in terms of degree of patient contact, staff involvement, caseload, and service intensity. Table 6.1 displays these treatment elements by program type for each of the fourteen programs included in this study. The average number of therapeutic contacts provided during one week per patient at each site varies from a minimum of 1.64 to a maximum of 13.07 contacts. The two sites representing the minimum and maximum average contacts

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[iv] The Patient Care Survey Therapeutic Contacts Log was administered during one week in April, 1995 to typify the care provided by staff on each of the psychiatric units involved in the long term mental health enhancement program .

per patient are both STAR programs. There is considerable variance across sites, regardless of program type, in this measure. In other words, some sites have considerably more contact with patients than other sites. Moreover, the degree of contact does not seem related to treatment program type. Assuming equivalent psycho-social needs, degree of patient contact may demonstrate a significant association with quality of life. Programs that have more contact with patients may be able to monitor their patients psycho-social needs more easily and respond more readily to their clients. Consistent and ongoing contact with patients is an important element of continuity of care. Thus continuity of patient contact and program response may help improve client access to community resources and further the social integration process.

Table 6.1 also displays the degree of staff involvement in providing mental health treatment. The average number of therapeutic contacts provided during one week per staff member varies between 11.33 and 54.17 contacts. Overall, this variability does not appear to be related to treatment program type. Further indication that treatment program type is a poor measure of treatment context. However, there is some indication that staff members at IPCC programs may be in contact with patients more often than other programs. These data indicate that staff at certain treatment programs are clearly meeting with patients more often than staff at other treatment programs. The degree of staff involvement in the client's mental health treatment may influence a client's quality of life. Perhaps, staff who maintain more regular contact with clients provide more continuous care which results in improved access to resources and improved overall well-being. These claims should be tested in multivariate models that control for salient characteristics of the client such as mental health functioning. At a descriptive level, these data indicate that there is treatment program variability. Perhaps this variability would explain a portion of the differences in quality of life by treatment program.

Table 6.1: Degree of Staff Involvement and Patient Contact across Fourteen Program Sites by Treatment Program Type

Average Number of Contacts per Patient	Average Number of Contacts per Staff Member	Average Number of Patients per Staff Member	Average Treatment Time per Patient	Average Treatment Time per Staff Member
STAR PROGRAMS (7)				
1.64	13.67	8.33	0.86	7.17
13.07	21.15	1.62	5.90	9.55
7.43	22.28	3.00	2.62	7.85
8.96	19.31	2.15	3.01	6.48
10.55	16.84	1.60	5.10	8.14
4.33	17.33	4.00	2.91	11.63
8.19	26.00	3.18	1.22	3.88
IPCC PROGRAMS (3)				
5.60	54.17	9.67	1.30	12.58
6.22	24.40	3.92	2.24	8.80
3.10	35.00	11.29	1.06	12.00
DTC PROGRAMS (4)				
2.81	20.89	7.44	1.15	8.58
2.62	11.33	4.33	1.52	6.58
6.28	61.00	9.71	1.58	15.39
2.74	21.40	7.80	1.68	13.10

In addition to the number of contacts provided each week to patients by staff, I should know something more about the length of time patients typically spend in treatment. Again, there is considerable variability among treatment programs in the time intensity of patient contacts as displayed in table 6.1. On average, clients spend between .86 and 5.90 hours in mental health treatment per week. Table 6.1 also displays the variability among treatment programs in time intensity of staff involvement. On average, staff members spend between 3.88 and 15.39 hours providing mental health treatment per week. Here again, there appears to be no pattern of treatment time intensity (patient or staff-related) associated with treatment program type. Overall variability in time intensity across the fourteen treatment program sites could be related to the degree to which a few staff provide most of the care or a few patients use most of the treatment resources. If a few patients are using most of the treatment program's resources they could pull staff time and energy away from other potentially needy clients. This may result in poorer care overall for some clients in treatment programs with a group of high-use clients.

Table 6.1 also illustrates the degree of variability in weekly caseload among treatment programs. On average, for a one-week period the number of clients each staff member saw ranged between 1.6 and 11.3 across treatment programs. There is strong evidence in the literature that caseload is related to the quality of care provided. Smaller caseloads tend to favor a closer relationship between staff members and clients and more continuous service. However, these caseload numbers include individuals who received care only during the surveyed week. Staff are likely responsible for more clients than represented in these one-week caseload figures. On the whole, I conclude, again, that variability among treatment programs in terms of weekly caseload appears to be unrelated to treatment program type.

Finally, the patient care survey data also suggest considerable variability in the focus of treatment programs across a variety of service areas: leisure activities; community meetings; biological/psychological interventions; intensive one-to-one observation; brokerage, linkage, discharge and treatment planning; family/caregiver intervention; active treatment (behavioral, psychotherapeutic and psychosocial rehabilitation intervention); and other services. Table 6.2 displays the proportionate allocation of treatment time by service type across treatment programs.

Clearly, the 14 programs provide very different patterns of care. These data provide an overview of the types of care provided at each treatment program. Again, as with the other patient care survey data presented, variability among treatment program sites in terms of service focus appears to be unrelated to treatment program type. Most sites tend to provide primarily active treatment, however, one of the STAR program sites and one of the DTC program sites focuses primarily on treatment planning and brokerage activities. Treatment programs focused primarily on active treatment may improve the social skill levels of their client population to a greater extent than programs with a planning focus. This may translate into improved satisfaction with quality of life in the social domain area. Likewise, treatment programs focused more on brokerage and linkage activity, may be able to access needed resources such as income assistance and housing to a greater extent than programs with an active treatment focus. These linkage-focused programs may be able to improve their client's overall quality of life in the housing and financial domain areas to a greater extent than other programs with less linkage activity.

I have provided a very brief summary of the study and a description of recent data highlighting treatment program variability. The study described in this dissertation suggests that certain patients are better suited for certain programs in terms of quality of

Table 6.2: Service Focus of Treatment Programs by Treatment Program Type

Proportion of Total Treatment Time by Service Area

Active	Family	Planning	One-to-one	Bio/Psych	Community	Leisure	Other
STAR PROGRAMS (7)							
16.28%	4.65%	79.07%	0.00%	0.00%	0.00%	0.00%	0.00%
49.65%	1.23%	22.86%	3.16%	1.54%	1.15%	19.71%	0.69%
44.96%	2.65%	25.13%	0.71%	0.18%	2.12%	21.06%	3.19%
64.39%	0.89%	12.46%	7.72%	0.59%	0.59%	11.57%	1.78%
42.62%	1.19%	13.03%	22.15%	6.05%	2.23%	7.88%	4.86%
59.14%	0.00%	17.20%	0.00%	10.75%	0.00%	11.47%	1.43%
56.44%	1.89%	35.23%	0.00%	3.79%	0.76%	1.89%	0.00%
IPCC PROGRAMS (3)							
43.05%	8.94%	33.44%	0.00%	0.00%	0.00%	14.57%	0.00%
63.52%	3.52%	22.84%	2.05%	4.77%	0.80%	2.16%	0.34%
44.05%	0.00%	42.86%	0.00%	3.57%	7.74%	0.00%	1.79%
DTC PROGRAMS (4)							
45.31%	1.62%	32.36%	0.97%	0.00%	0.65%	19.09%	0.00%
36.08%	0.63%	5.70%	5.70%	2.53%	3.16%	46.20%	0.00%
15.78%	0.23%	58.70%	0.00%	0.00%	0.23%	24.83%	0.23%
61.83%	0.00%	24.81%	3.05%	0.00%	0.00%	10.31%	0.00%

life improvement. What remains in this chapter is a fuller discussion of the theoretical and methodological implications of this study.

Theoretical Implications

In this study I analyzed the individual's quality of life as an outcome of the "fitness" between his or her personal characteristics and treatment program environment. Overall, this study did not support the premise that program type explains differences in client outcomes between treatment programs. Although treatment program type offered little in terms of explanation, there is clear evidence that quality of life varies significantly between treatment programs regardless of many client characteristics associated with individuals situated in particular programs. In other words, although some programs may indeed contain more of the lowest functioning, oldest, schizophrenic clients with the poorest socio-economic status, the multilevel method employed here controls for the composition of different treatment programs by virtue of including these individual covariates in the model.

Furthermore, the effect of functional status and psychiatric diagnosis on quality of life varied significantly between treatment programs. Some treatment programs are better suited to provide services to poor functioning clients and clients with schizophrenia than other programs. Future work should investigate what aspects of the treatment program might explain these differences. Perhaps programs with a smaller client to staff ratio and those involving more social workers and occupational therapists would provide a better fit for poorer functioning clients.

As introduced in the second chapter, "fitness" connotes a variety of program alternatives, not one best setting or program. Although this study does not reveal what aspects of the program result in a better quality of life for particular patients, it does

provide clear evidence of significant differences in quality of life between treatment programs. Additionally, functional status and psychiatric diagnosis appear to be differentially affected by treatment programs in terms of quality of life in several domain areas. Again, this indicates that lower functioning clients and clients with schizophrenia improve their quality of life to a greater extent in particular treatment programs. It may be that some treatment programs are specifically designed to assist clients with schizophrenia or lower functioning clients by providing enhanced social skills training, sheltered employment and supported housing options. I need to understand more about what specific elements of treatment programs result in an enhanced quality of life for some clients and not others. Thus, specificity is required in order to provide support for the notion of ecological fitness between clients and their treatment environment.

Relationship between Mental Health Services and Quality of Life

In addition to the ecological perspective, this study investigated the quality of life of deinstitutionalized clients across a broad spectrum of quality of life domains and the impact of mental health service interventions and treatment program orientation on quality of life. Most mental health service users prefer the community to the hospital setting.[264] However, many recently deinstitutionalized individuals report problems arising from the enforced social isolation, loneliness, and absence of group membership associated with community living. The deinstitutionalized client's general well-being, the quality of his or her family and social relations, and engagement in leisure activities, as well as access to adequate housing, income and health care resources clearly impacts his or her ability to remain in a community setting.[265,266] These are the specific areas I investigated in this study, with a focus on the impact of mental health treatment strategies and orientations on quality of life over time.

Over time, program tenure or how long an individual receives treatment within the program is positively related to improvement in objective financial status, financial well-being, satisfaction with housing, and objectively-measured safety. Often, gaining access to such federal resources as SSI takes a considerable amount of time. Program staff may be able to assist clients in obtaining financial assistance over time. The improved satisfaction with housing indicates a common effect of clients in transition from inpatient to outpatient settings. Previous studies have reported consistently improving satisfaction with housing as clients move from inpatient to outpatient settings. Over time, however, degree of contact with family members declines. It may be that the longer an individual remains in the treatment program, the more difficult it is for the individual to maintain family contact. Over time, clients may shift their social network to include more engagement with members of their residential community and less engagement with family members. Additionally, family members may not want to visit with the client in their new residential community.

Case Management Services

Often, the period of discharge to a community setting and the subsequent re-entry into the workforce and/or family environment represents a vulnerable time for clients, requiring additional supports such as case management. Case management services are envisioned by service providers as a mechanism for easing the adjustment to community living. This study illustrates that the provision of case management improves the client's quality of life and well-being in several domains: health, housing, leisure and social. Additionally, case management was associated with increased engagement in leisure and social activities. These effects obtain independently of the functional status of the client as well as a variety of other salient covariates. In other words, regardless of how poorly a client is functioning, case management appears to have a positive influence on quality of life across several domain areas. Case management may result in improved targeting of

interventions and services which may, in turn, increase the use of appropriate resources (e.g., engagement in leisure and social activities) by individuals receiving case management. The coordinating function of the case manager may ultimately result in improved continuity of care and a more appropriate use of mental health and social resources.

Additionally, the mere contact of the case manager with the client may constitute a type of therapeutic relationship. Perhaps a general diffusion effect evolves from the social exchange between the case manager and the client, influencing further involvement on behalf of the client in social and leisure activities. Indeed, case management was related to the social and leisure domains across both the subjective and objective dimensions. These domain areas indicate the client's degree of social involvement in activities such as movie-going, shopping, and getting together with friends and their feelings of satisfaction about this involvement. It may be that social contact itself, that between the client and case manager, influences positive social engagement in other areas as well.

Equally important, however, are the quality of life domain areas where case management appeared to have no significant effect. These areas include the family, finance and safety domains as objectively and subjectively measured. These study findings indicate that case management has no measurable effect on the individual's financial and safety situation nor involvement with family members. Furthermore, case management is also not associated with satisfaction in these same areas. There could be a variety of reasons for the lack of a common effect of case management across all quality of life domains. Each of these reasons point to different possible interventions including staff training, community needs assessment and policy reform.

Since case management had measurable effects on several quality of life domains, it may be possible to improve the degree of correspondence between case management activities and specific quality of life domains. Perhaps more attention to training and informing case managers about the availability of financial and housing resources for clients with serious mental illness is needed. It may be that access to these particular resources are lacking in a given community, or even nationally. Policy-makers may want to investigate the degree of availability of supported residential programs and adequate housing resources for the mentally ill. Furthermore, although categorical federal programs such as SSI do provide income assistance for many individuals with SMI, more investigation is needed into the timeframe and paperwork required to access SSI resources and the adequacy of such resources once obtained.

Case managers also may have little impact on family relations or overall safety. The degree of involvement of the client with his or her family may be a rather intractable area for case managers to influence. Perhaps different modes of family therapy, although controversial for persons with SMI, may assist in addressing the issue of family involvement in the lives of persons with SMI. Furthermore, the degree of overall safety experienced by the client may have much to do with location of residence, peer group and engagement in illicit activity including substance abuse. These are issues needing further investigation.

Treatment Strategies for Specific Sub-Populations

Beyond the general effect of case management services across a variety of quality of life domain areas, specific sub-populations exhibit some potentially meaningful associations with select quality of life domains.

Lower Functioning Clients

A strong association between functional status and quality of life exists across most of the objective and subjective quality of life domains. Clearly, lower-functioning clients display lower quality of life. Perhaps lower functioning clients are poor candidates for community placement or, at a minimum, require community placement with such additional resources as supported housing with 24 hour on-site supervision. These clients may not possess the requisite psycho-social skills to deal with issues of community living such as social interaction with neighbors and shopping for groceries. Accordingly these findings may indicate that extra attention should be focused on clients at the low end of the functional scale. Perhaps these clients should be guided toward social skills training and supported employment and housing programs specifically designed for poorer functioning clients.

Older Clients

Older individuals do worse in terms of financial status, family relations and engagement in leisure and social activities. The declining self-assessed financial status of the elderly individual may indicate that older individuals have less access to employment income as they age and that the availability of social security income based on age may interfere with the ability of the client to continue obtaining the same level of disability assistance. Additionally, costs related to transportation and health care may also increase as a person ages limiting the financial ability of the client to spend money in other areas, such as going to the movies. Indeed poor financial status may relate to declining engagement in social and leisure activities among older individuals.

Treatment programs may be able to focus more attention on specific social and leisure activities designed for older individuals. The decline in family relations as one ages may mimic the trend evident in the general population, that of increased social

isolation as family members age. For example, spouses and parents may be deceased or too frail to make frequent visits. There is little that a program may be able to do to enhance relations with family members among aged individuals, however, shifting focus to social and leisure activities with a broader social group may help alleviate some of the negative effects of poor family relations. Overall, a fuller investigation is warranted on the quality of life of elderly persons with serious mental illness and the broader effect of aging over time on this population.

Socio-Economic Status

At program entry, individuals with more formal education have better relations with family members and engage in more leisure and social activities. It may be that individuals acquire more social skills the longer they are in a school social environment. Additionally, individuals who are currently employed at the time of treatment program enrollment have less access to financial resources for purchasing needed items such as food and clothing. Individuals who are employed surely have reduced access to government-sponsored income assistance programs that would provide resources for such items as food and clothing. Indeed, the effect of access to financial resources is specifically tested in this analysis. As expected, as access to financial resources improves (number of income sources), so does the ability of the client to obtain resources such as food and clothing. Furthermore, at baseline, individuals with more access to financial resources (income) revealed better family relations and more engagement in social and leisure activities.

Interestingly, at baseline, individuals with more financial resource availability experienced a poorer quality of life in the health and safety domain areas across the subjective and objective dimensions. Financial resource availability includes a variety of income assistance programs such as Social Security Disability Income (SSDI) and

Section 8 certificates for rental supplements. Therefore, individuals who indicate more access to financial resources may obtain these additional resources by virtue of a disability (above and beyond their SMI). These same individuals may reflect less satisfaction with their health and access to health care services. Similarly, individuals receiving supplemental income to cover rent may be residing in substandard housing. These individuals may reflect less satisfaction with their housing.

Over time, as access to financial resources improves, clients experienced a decreasing ability to purchase such needed items as food and clothing, and a decreasing engagement in social activity. Again, increasing access to financial resources may indicate a client with a variety of dysfunctions (not captured by the GAF measure) enabling them to access a variety of income assistance programs while reducing their ability to engage in social activity and spend money on shopping and social activities. Over time, increasing access to financial resources positively affected satisfaction with health and health services and overall safety as objectively and subjectively measured.

In general, individuals with access to more income sources engaged in leisure and social activities to a greater extent and indicated better family relations *at program entry* than individuals with more restricted income access. The relationship between access to economic resources and social isolation should be investigated further, particularly as it may be related to aging as well. Indeed, in the financial quality of life domain, older individuals are less satisfied with their financial situation and less engaged with their families, leisure and social activities. The pearson correlation statistic revealed a strong bivariate association between age and income. Clearly, the confluence of factors affecting increasing social isolation related to declining functional status and aging for the person with serious mental illness represents a worthwhile future study.

Methodological Implications

I employed a multilevel modeling framework because I was interested in the concurrent effects of client and treatment program characteristics on quality of life over time. Multilevel modeling techniques were necessary to this study because of its three levels of data: time, individual, and program. However, investigating a larger group of treatment programs would allow more rigorous testing of treatment program effects on quality of life.

Another limitation relates to the measurement of case management which was a dichotomized representation of exposure (1) or no exposure (0). It is encouraging to know that case management exposure even measured in this weak fashion and controlling for other salient dimensions, is statistically related to quality of life. However, this dichotomized variable provides no information about the type of case management provided. Likewise, although the multilevel methodology informs us about significant between program variation, I was unable to explain this variation using treatment program typology.

These results suggest that the treatment programs need to be described in more detail in order to capture between program differences in structure, context or process that might explain between program differences in outcome. Multilevel methodology would again provide an ideal statistical tool for testing the effect of differing treatment structures and processes on quality of life and other outcome variables and on the relationship between client characteristics and these outcome variables. Again, in order to incorporate additional covariates at the program level of analysis, a larger group of treatment programs should be included in the study.

Limitations

Overall, these models reveal relatively strong support for the hypothesized time level effects, less support for the hypothesized individual level effects and little to no support for the hypothesized program level and moderation effects. As the level of the data increases the number of observations decreases from approximately 4000 time points, to 900 individuals to 14 programs. These findings may indicate a diminishing degree of power related to modeling at each level of analysis.

Recall that this sample primarily consists of a group of single (92%) white (83%) males (96%). The sample analyzed here typifies the particular population studied, the U.S. Veteran population with serious mental illness. This population does indeed primarily consist of single white males. Given the particular institutional environment of the U.S. veteran health care system and the disproportionate number of males in this group compared to the general population, these findings are reasonably generalizable to the U.S. veteran population with SMI. Additionally, this study specifically focused on a population of veterans with chronic and persistent mental illness. Taking into consideration the disproportionate number of males in this VA population, these findings may also be reasonably extended to the larger population of persons with chronic and persistent mental illness outside the VA system.

At the program level of analysis, this model included a rather weak measure of treatment program orientation (treatment program type). In addition to fleshing-out the degree of structure provided by different treatment programs, still a conceptually relevant and important hypothesized predictor of quality of life, more attention is needed at the treatment program level. As the patient care survey data suggests, issues related to staff involvement, patient contact and service orientation represent potentially meaningful variables in explaining between program variance in quality of life.

Furthermore, a fuller description of case management services is needed. In this study, I simply know whether an individual was receiving case management services or not at any given time point. I do not know what type of case management service is being provided. Issues such as the case manager client load, the occupational orientation of the case manager and the nature of the case management services offered (service brokerage vs. therapy) will likely affect the client's degree of social integration. Although this study indicated that the relationship between case management and quality of life did not vary significantly by client, it did not explore this same variance by treatment program. In other words, particular treatment programs may be more effective at providing case management services than other programs. These limitations point to potential future studies.

Future Studies

I have discussed several areas that warrant further investigation including: 1) the process of care at different sites, 2) the content of case management service and 3) sub-population groups including schizophrenics, low functioning clients, older clients and clients with poor socio-economic status.

To begin, the patient care survey data introduced earlier in this chapter provides some potential for describing the types of services provided by each treatment program beyond mere case management exposure. For example, some programs clearly provide more leisure activities than other programs and I might expect these differences to relate to differences among treatment programs in the leisure quality of life domain. This data might also be used to describe the content of case management provision at each site. In addition, any future investigation of case management should explore the effect of treatment program characteristics on case management provision and how this relates to

quality of life as well as other key outcomes such as recidivism and medication compliance.

In addition to studying the effects of these specific treatment strategies on quality of life and other outcome variables, these differing treatment strategies might also explain differences between programs in how different sub-population groups fare in one program or another. For example, programs with a smaller caseload and a strong focus on psycho-social rehabilitation and linkage efforts may provide better care for schizophrenics, poorer functioning clients, older clients or clients with lower socio-economic status than programs with less of a focus on these areas and a larger caseload.

Summary

In light of the highly dysfunctional population studied, these findings are particularly important. Over time, I see a clear increase in quality of life across most domain areas. Overall, during the course of treatment program participation, these clients obtain access to greater resources, engage in social and leisure activities to a greater extent and are more satisfied across a wide range of life domain areas. It is encouraging to know that this highly impaired group of clients with chronic and persistent mental illness experiences measurable improvement over time in their quality of life. I might not expect a significant degree of clinical improvement over time in this population given the chronic nature and severity of their illness. Even though these clients may not improve measurably in terms of their clinical status, they experience clear improvement in quality of life across several domain areas.

Additionally, this study suggests that case managers may have a measurable influence on quality of life and may be able to translate this influence to other areas such as improvement in accessing housing and financial resources. Managers may want to

consider assessing the degree of resource knowledge among staff members across the quality of life domains (family, finance, health, housing, leisure, safety and social). Perhaps additional training is needed to facilitate increased access to financial resources, for example. Policy makers may want to investigate the current housing and economic conditions of persons with SMI. It may be that additional funding is needed to provide adequate supported housing and economic support for persons with SMI.

Additionally, this study highlights some potential target areas: aging clients with SMI, poor functioning clients and economically-disadvantaged clients within the U.S. veteran health care system. These sub-population groups appear to have the lowest level of quality of life across the sample. Researchers may want to direct their efforts at understanding more fully the impact of age, functional status and socio-economic status on persons with SMI. Perhaps treatment programs could be better equipped to deal with these sub-population groups through enhanced training and specialized funding.

Finally, this study points to the importance of the treatment program in enhancing certain quality of life domains. While the effect of the treatment program on quality of life is certainly much smaller than the effect of individual-level characteristics of the client, treatment program staff should be encouraged to know that their work does make a difference in the lives of veterans with SMI. Also, factors beyond the treatment program environment are presumably important as well, such as community access to good housing, safe neighborhoods and social support. By studying these and other aspects of the social environment we should be able to improve the overall social condition of U.S. veterans with serious mental illness.

APPENDICES

APPENDIX A

Literature Review Procedure

To begin, a search was conducted using PaperChase to obtain a complete list of all studies related to serious mental illness by searching for the following key words: serious mental illness, severe mental illness, and chronic mental illness. PaperChase allows access to the following four databases of the National Library of Medicine and the National Cancer Institute: Medline, HealthSTAR, AIDSLINE and CANCERLIT. These illness categories were then cross-referenced with each of the following key words related to outcome studies: outcome assessment, treatment outcome, and outcome. This resulted in 202 studies of outcomes related to persons with serious mental illness.

The next stage involved a cross-referencing of studies with known review articles related to outcomes research on persons with serious mental illness.[i] Abstracts or articles

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[i] Pfeiffer, S.I., O'Malley, D.S., and Shott, S. *Factors associated with the outcome of adults treated in psychiatric hospitals. A synthesis of findings.* Psychiatric Services. 47(3). pp. 263-269. March 1996.

Klinkenberg, W.D., and Calsyn, R.J. *Predictors of receipt of aftercare and recidivism among persons with severe mental illness: A review.* Psychiatric Services. 47(5). pp. 487-496. May 1996.

Rubin, A. *Is case management effective for people with serious mental illness? A research review.* Health and Social Work. 17(2). Pp. 138-151. May 1992.

Solomon, P. *The efficacy of case management services for severely mentally disabled clients.* Community Mental Health Journal. 28(3). pp. 163-180. June 1992.

Lehman, A.F., Dixon, L.B., Levine, J., Scott, J.E., and Thompson, J.W. Literature Review: Schizophrenia Patient Outcomes Research Team (PORT). Chapters 11-13. Submitted January 31, 1994.

were reviewed as necessary to eliminate studies solely focused on any of the following specific areas: substance abuse comorbidity, children, medication testing or specific clinical procedure testing (e.g. ECT), individual or group psychotherapy, inpatient, nursing home or prison populations, or diagnostic groups outside the serious mental illness category. Furthermore, studies with a sample size under 11 were eliminated as they tended to be non-experimental in nature and resembled a case study framework. Finally, studies which represented process descriptions rather than outcome analyses were also eliminated.

The resultant group of relevant outcomes studies consists of the following 132 articles:

Aberg-Wistedt, A., Cressell, T., Lidberg, Y., Liljenberg, B. and Osby, U. *Two-year outcome of team-based intensive case management for patients with schizophrenia.* Psychiatric Services. 46(12) pp. 1263-1266. December, 1995.

Affleck, J.W. , Burns, J. and Forrest, A.D. *Long-term follow-up of schizophrenic patients in Edinburgh.* Acta Psychiatrica Scandinavica. 53(3). pp. 227-37. March, 1976.

Anthony, W.A., Rogers, E.S., Cohen, M. and Davies, R.R. *Relationships between psychiatric symptomatology, work skills, and future vocational performance.* Psychiatric Services. 46(4). pp. 353-358. April, 1995.

Azrin, N.H. and Philip, R.A. *The job club method for the job handicapped: A comparative outcome study.* Rehabilitation Counseling Bulletin. 23. pp. 144-155. 1980.

Audini, B., Marks, I.M., Lawrence, R.E., Connolly, J. and Watts, V. *Home-based versus out-patient/in-patient care for people with serious mental illness.* British Journal of Psychiatry. 165(2). pp. 204-10. August, 1994.

Beard, J.H., Pitt, R.B., Fisher, S.H., and Goetzel, V. *Evaluating the effectiveness of a psychiatric rehabilitation program.* American Journal of Orthopsychiatry. 33. pp. 701-712. 1963.

Bell, M.D. and Lysaker, P.H. *Psychiatric symptoms and work performance among persons with severe mental illness.* Psychiatric Services. 46(5). pp. 508-510. 1995.

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APPENDIX B

Multilevel Model in Equation Form

This appendix contains the specific multilevel equations tested as driven by the stated hypotheses. Equation 1.1 corresponds to the proposed level-1 analysis. Equations 2.1 through 2.3 correspond to the proposed level-2 analysis. Equations 3.1 through 3.26 correspond to the proposed level-3 analysis. The complexity of the model increases substantially as the level of analysis is raised as each level incorporates the lower level(s) of analysis. This is because parameters produced from the lower level analyses become the outcome variables in higher level analyses. All three levels of analysis are conditioned simultaneously.

For ease of explanation, each parameter model is presented separately. The following equations represent the specific model tested in this analysis. I begin with the level 1 model proposed; the within-person time model.

Level 1 *(Time Level)*

Specific Within-subject Model Proposed

$$Y_{tij} = \pi_{0ij} + \pi_{1ij}(\text{Years})_{tij} + \pi_{2ij}(\text{Client Functioning})_{tij} + \pi_{3ij}(\text{Case Management})_{tij} + \pi_{4ij}(\text{CM x GAF})_{tij} + e_{tij} \quad [1.1]$$

All covariates in Equation [1.1] vary over time. Equation [1.1] proposes that client functioning (GAF), case management exposure, and the passage of time (Years) itself explain a portion of the individual client's quality of life. Furthermore, case management is expected to moderate the effect of client functioning on quality of life (the interaction term). All predictor variables in the above equation are included as time-varying covariates. For example, a given client's functional status and exposure to case management services as assessed at several time points is incorporated in the above model.

Level 2 (Individual Level)

Specific Between-subject Model Proposed - Intercept (QOL at Baseline)

$$\pi_{0ij} = \beta_{00j} + \beta_{01j}(\text{Education})_{ij} + \beta_{02j}(\text{Income})_{ij} + \beta_{03j}(\text{Employment})_{ij} + \beta_{04j}(\text{Marital Status})_{ij} + \beta_{05j}(\text{Gender})_{ij} + \beta_{06j}(\text{Ethnicity})_{ij} + \beta_{07j}(\text{Age})_{ij} + \beta_{08j}(\text{Institutional Stay})_{ij} + \beta_{09j}(\text{Primary Diagnosis})_{ij} + r_{0ij} \quad [2.1]$$

Specific Between-subject Model Proposed - Slope (QOL Trajectory)

$$\pi_{1ij} = \beta_{10j} + \beta_{11j}(\text{Education})_{ij} + \beta_{12j}(\text{Income})_{ij} + \beta_{13j}(\text{Employment})_{ij} + \beta_{14j}(\text{Marital Status})_{ij} + \beta_{15j}(\text{Gender})_{ij} + \beta_{16j}(\text{Ethnicity})_{ij} + \beta_{17j}(\text{Age})_{ij} + \beta_{18j}(\text{Institutional Stay})_{ij} + \beta_{19j}(\text{Primary Diagnosis})_{ij} + r_{1ij} \quad [2.2]$$

Specific Between-subject Model Proposed - Slope (CM-QOL)

$$\pi_{3ij} = \beta_{30j} + \beta_{38j}(\text{Institutional Stay})_{ij} + \beta_{39j}(\text{Primary Diagnosis})_{ij} + r_{3ij} \quad [2.3]$$

Specific Between-subject Model Proposed (Fixed Effects)

$$\pi_{2ij} = \beta_{20j} \quad [2.4]$$

$$\pi_{4ij} = \beta_{40j} \quad [2.5]$$

Equations [2.1] and [2.2] propose that the client's socio-economic status, marital status, gender, ethnicity, age, history of institutional stay and primary diagnosis at program entry will determine a portion of the client's baseline quality of life status (π_{0ij}) and rate of change in quality of life over time (π_{1ij}). Equation [2.3] indicates that the client's primary diagnosis at program entry and history of institutional stay explains a portion of the relationship (π_{3ij}) between case management and quality of life. Equations [2.4 and 2.5] are considered fixed effects because no variance is anticipated in these parameters across clients. Equation [2.4] indicates that the parameter corresponding to the effect of clinical functioning over time will not be modeled. In other words, no

interactions effects are proposed between this within-client characteristic (functioning) and any client-level characteristics. Equation [2.5] indicates that no three-way interactions are proposed between the within-client interaction term (case management x functioning) and any client-level characteristics. Since we are not proposing to model certain parameters (π_{2ij} and π_{4ij}) with client-level characteristics, their value is set at the mean level for a given characteristic across individuals within the same program.

Level 3 *(Program Level)*

Specific Between-Group Model Proposed (Main Effect of Program)

$$\beta_{00j} = \gamma_{000} + \gamma_{001}(\text{STAR Program})_j + \gamma_{002}(\text{DTC Program})_j + \mu_{00j} \qquad [3.1]$$

$$\beta_{10j} = \gamma_{100} + \gamma_{101}(\text{STAR Program})_j + \gamma_{102}(\text{DTC Program})_j + \mu_{10j} \qquad [3.2]$$

Specific Between-Group Model Proposed (Program x Psychiatric Profile)

Clinical Status:

$$\beta_{20j} = \gamma_{200} + \gamma_{201}(\text{STAR Program})_j + \gamma_{202}(\text{DTC Program})_j + \mu_{20j} \qquad [3.3]$$

Institutional Stay:

$$\beta_{08j} = \gamma_{080} + \gamma_{081}(\text{STAR Program})_j + \gamma_{082}(\text{DTC Program})_j + \mu_{08j} \qquad [3.4]$$

$$\beta_{18j} = \gamma_{180} + \gamma_{181}(\text{STAR Program})_j + \gamma_{182}(\text{DTC Program})_j + \mu_{18j} \qquad [3.5]$$

Primary Diagnosis:

$$\beta_{09j} = \gamma_{090} + \gamma_{091}(\text{STAR Program})_j + \gamma_{092}(\text{DTC Program})_j + \mu_{09j} \quad [3.6]$$

$$\beta_{19j} = \gamma_{190} + \gamma_{191}(\text{STAR Program})_j + \gamma_{192}(\text{DTC Program})_j + \mu_{19j} \quad [3.7]$$

Specific Between-Group Model Proposed (Fixed Effects)

$$\beta_{40j} = \gamma_{400} \quad [3.8]$$

$$\beta_{01j} = \gamma_{010} \quad [3.9]$$

$$\beta_{02j} = \gamma_{020} \quad [3.10]$$

$$\beta_{03j} = \gamma_{030} \quad [3.11]$$

$$\beta_{04j} = \gamma_{040} \quad [3.12]$$

$$\beta_{05j} = \gamma_{050} \quad [3.13]$$

$$\beta_{06j} = \gamma_{060} \quad [3.14]$$

$$\beta_{07j} = \gamma_{070} \quad [3.15]$$

$$\beta_{11j} = \gamma_{110} \quad [3.16]$$

$$\beta_{12j} = \gamma_{120} \quad [3.17]$$

$$\beta_{13j} = \gamma_{130} \quad [3.18]$$

$$\beta_{14j} = \gamma_{140} \quad [3.19]$$

$$\beta_{15j} = \gamma_{150} \quad [3.20]$$

$$\beta_{16j} = \gamma_{160} \quad [3.21]$$

$$\beta_{17j} = \gamma_{170} \quad [3.22]$$

$$\beta_{30j} = \gamma_{300} \quad [3.23]$$

$$\beta_{38j} = \gamma_{380} \quad [3.24]$$

$$\beta_{39j} = \gamma_{390} \quad [3.25]$$

Equations [3.1] and [3.2] represent the proposed main effect of program orientation on quality of life; its baseline value and change trajectory. Equation [3.3] represents the proposed moderation effect of program orientation on the relationship ($ß_{20j}$) between clinical functioning and quality of life. Equations [3.4] and [3.5] reflect the proposed moderation effect of program orientation on the relationship ($ß_{08j}$ and $ß_{18j}$) between history of institutional stay and quality of life; its baseline value and change trajectory. Equations [3.6 and 3.7] reflect the proposed moderation effect of program orientation on the relationship ($ß_{09j}$ and $ß_{19j}$) between primary diagnosis at program entry and quality of life; its baseline value and change trajectory.

Equations [3.8 and 3.25] are considered fixed effects because no variance is anticipated in these parameters across programs. The outcome parameter ($ß_{40j}$) is modeled using an overall program-level mean value and as such, represents a fixed effect. Specifically, equation [3.8] reflects the fact that no three-way interaction between case management, clinical functioning and program orientation is hypothesized. Equations [3.9] through [3.21] indicate that the relationships between quality of life and socio-economic status, marital status, gender, ethnicity and age are not expected to vary significantly across programs. Finally, equations [3.22] through [3.24] reflect the fact that no three-way interactions are proposed between program orientation, case management and primary diagnosis or institutional history.

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