

## Ten-Year Recovery Outcomes for Clients With Co-Occurring Schizophrenia and Substance Use Disorders

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The long-term courses of people with schizophrenia and of those with substance use disorder have been studied separately and extensively. The long-term course of clients with co-occurring schizophrenic and substance use disorders has, however, not been examined. This article reports 10-year outcomes for 130 clients with co-occurring schizophrenic and substance use disorders in the New Hampshire Dual Diagnosis Study. In addition, we report on 6 “recovery outcomes,” identified by dual diagnosis clients, as examples of positive coping behaviors. Longitudinal data were modeled using generalized estimating equation (GEE) methods. Participants improved steadily over 10 years in the outcome domains of symptoms, substance abuse, institutionalization, functional status, and quality of life. Further, at the 10-year follow-up, substantial proportions were above cutoffs selected by dual diagnosis clients as indicators of recovery: 62.7% were controlling symptoms of schizophrenia; 62.5% were actively attaining remissions from substance abuse; 56.8% were in independent living situations; 41.4% were competitively employed; 48.9% had regular social contacts with non-substance abusers; and 58.3% expressed overall life satisfaction. These 6 outcomes were only weakly interrelated over time, suggesting that recovery, as defined by clients, is a multidimensional concept. Overall, the 10-year findings on recovery outcomes provide a hopeful long-term perspective for dual diagnosis clients.

*Key words:* dual diagnosis/co-occurring disorders/  
substance abuse

### Introduction

Epidemiological data show clearly that individuals with schizophrenia have high rates of lifetime and current sub-

stance use disorders.<sup>1</sup> Numerous clinical studies show similar high rates.<sup>2–5</sup> Research also establishes clearly that clients with schizophrenia and current substance abuse are highly prone to adverse consequences, including poor treatment response,<sup>6</sup> relapse,<sup>7</sup> hospitalization,<sup>8</sup> HIV infection,<sup>9</sup> hepatitis C infection,<sup>10</sup> suicide,<sup>11</sup> and a variety of psychosocial difficulties, such as violence,<sup>12</sup> victimization,<sup>13</sup> incarceration,<sup>14</sup> homelessness,<sup>15</sup> and family difficulties.<sup>16</sup>

Research on the long-term outcomes of schizophrenia<sup>17,18</sup> and on the long-term outcomes of alcoholism and opioid addiction<sup>19,20</sup> suggests that many individuals with these disorders tend toward remission of symptoms and substantial improvements in functional role behaviors over years. Nevertheless, the long-term course of persons with co-occurring disorders has not been well documented.<sup>21</sup> Strong associations between comorbid substance abuse and adverse outcomes in schizophrenia clients have suggested pessimism regarding course, but recent evidence on treatment outcomes for people with co-occurring disorders indicates greater optimism, at least during the first 1–2 years.<sup>22–24</sup>

In attempts to conceptualize course and outcome, the concept of “recovery” has emerged as a central theme for mental health clients, providers, and advocates over the past decade. Recovery has been defined in numerous ways in the mental health literature,<sup>25</sup> including as an internal process, as a subjective appraisal of life beyond illness, in terms of objective outcomes, and in terms of mental health policies and services. Mental health clients’ writings<sup>26,27</sup> and testimonies<sup>28</sup> assert that recovery includes not just controlling illnesses but also pursuing independent, active, and satisfying lives in the community. The President’s New Freedom Commission on Mental Health<sup>28, p1</sup> defined recovery as “living, learning, working, and participating fully” in the community, regardless of the persistence or absence of symptoms. Although measuring an inconsistently defined concept like recovery is fraught with difficulties, researchers are beginning to address the task.<sup>29–32</sup>

Recovery has a different set of meanings in the field of substance abuse.<sup>20,33,34</sup> These definitions also variously address process and outcome, subjective and objective states, and functional status, but a consistent feature

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of recovery in the substance abuse field is sustained abstinence.

In a previous study of 3-year outcomes among clients with schizophrenia and co-occurring substance use disorders in the New Hampshire Dual Diagnosis Study, we reported that participants improved steadily in terms of reduced symptoms of schizophrenia, reduced alcohol and drug use, reduced hospitalization and homelessness, increased employment outcomes, increased contacts with non-substance abusers, and increased overall life satisfaction.<sup>35</sup> However, participants did not change significantly in independent living and in most areas of quality of life. Further, their overall recovery scores, defined as a combination of illness management and functional outcomes, were only modestly improved.

The present report examines the 10-year course of 130 clients with co-occurring schizophrenic and substance use disorders in the New Hampshire Dual Diagnosis Study. In this article the term “schizophrenia” denotes schizophrenia or schizoaffective disorder, and the term “substance abuse” is used synonymously with substance use disorder to refer to substance abuse or dependence on alcohol or other drugs (except nicotine). We specifically address 3 questions: (1) What is the 10-year course of disorders, functional outcomes, and quality of life for clients with co-occurring disorders? (2) Are recovery outcomes, as identified by dual diagnosis clients, related to each other, suggesting a single dimension of recovery, or are they relatively independent, suggesting a multidimensional construct? and (3) Do recovery outcomes and traditional outcomes continue to improve after 3 years of dual diagnosis treatment, or do they level off or recede?

## Methods

### *Overview*

The New Hampshire Dual Diagnosis Study is a prospective longitudinal study of clients with severe and persistent mental illness (chronic schizophrenia, schizoaffective disorder, or bipolar disorder) and co-occurring substance use disorder. The study was approved and reviewed by the Dartmouth Medical School and New Hampshire institutional review boards. The participants entered a 3-year randomized controlled trial of 2 forms of care management between 1989 and 1992.<sup>36</sup> All participants received integrated dual disorders treatment from their respective mental health centers for 3 years. After the 3-year trial, participants were released from their experimental conditions and received treatment as usual (if they remained in treatment) during the subsequent years. This article examines the 10-year course of outcomes for participants with co-occurring schizophrenia (schizophrenia or schizoaffective disorder) and substance use disorder (abuse or dependence).

### *Study Group*

The original participants included 223 clients with co-occurring disorders from 7 of New Hampshire's 10 community mental health centers. These participants were similar to other clients with severe mental illnesses and substance abuse in the New Hampshire public mental health system at the time of study entry.<sup>36</sup> Of the original cohort, 119 were diagnosed with schizophrenia and 50 with schizoaffective disorder; 130 of these 169 participants (76.9%) remained in the study at 10 years; 23 (13.6%) had dropped out or were lost to follow-up; and 16 (9.5%) had died. The 130 participants at 10 years did not differ significantly from those lost to attrition in terms of demographic and clinical characteristics. We report here on the 130 participants who have been studied continuously for 10 years.

### *Procedures*

Participants were recruited to the study through informational meetings with clients, families, and mental health professionals. Interested clients met with a research interviewer to confirm eligibility criteria, based on a research diagnostic interview and a review of clinical records by research psychiatrists. After providing written informed consent for all research procedures, participants completed baseline assessment procedures and were randomly assigned within site to 1 of 2 forms of care management, assertive community treatment or standard case management, both of which entailed integrated mental health and substance abuse treatments.<sup>37</sup> At study entry (baseline) and every 6 months throughout the 3-year follow-up, researchers assessed each participant by conducting urine toxicology tests, administering 1.5-hour structured interviews, and collecting clinician ratings of substance use disorder. After the 3-year trial ended, participants were followed up using similar procedures at yearly intervals.

### *Measures*

Research psychiatrists established diagnoses of co-occurring severe mental illness and substance use disorder using the Structured Clinical Interview for DSM-III-R.<sup>38</sup> At baseline the research interview included items from the Uniform Client Data Inventory<sup>39</sup> to assess demographic information; the Time-Line Follow-Back<sup>40</sup> to assess days of alcohol and drug use over the previous 6 months; the medical, legal, and substance use sections from the Addiction Severity Index (ASI)<sup>41</sup>; detailed chronological assessment of housing history and institutional stays using a self-report calendar, supplemented by outpatient records and hospital records<sup>42</sup>; the Quality of Life Interview (QOLI)<sup>43</sup> to assess objective and subjective dimensions of quality of life; the Expanded Brief Psychiatric Rating Scale (BPRS)<sup>44</sup> to assess current psychiatric symptoms; and management information

systems data to assess service utilization. To the QOLI questions on social function, we added a similar question on “regular contact with friends who do not use alcohol or other drugs” because clients on our advisory board and in previous studies had consistently reported that this behavior represents the key social challenge in attaining stable remission. In addition, we conducted urine toxicology screens in our laboratory using EMIT enzyme immunoassay (Syva-Behring) to assess drugs of abuse following each yearly assessment. Follow-up interviews contained the same instruments, without reassessing demographic and lifetime information. Reliabilities on all scales were satisfactory, with intraclass correlation coefficients ranging from .94 to 1.00 for interrater reliabilities and from .41 to .94 for test-retest reliabilities.

To supplement the substance abuse assessments, clinicians (case managers) rated participants every 6 months on 3 rating scales: the Alcohol Use Scale (AUS),<sup>2</sup> the Drug Use Scale (DUS), and the Substance Abuse Treatment Scale (SATS).<sup>45</sup> The AUS and DUS are 5-point scales based on DSM-III-R criteria for severity of disorder: 1 = abstinence, 2 = use without impairment, 3 = abuse, 4 = dependence, and 5 = severe dependence. The SATS is an 8-point scale that indicates progressive participation in treatment and movement toward stable remission from substance abuse according to Osher and Kofoed’s<sup>46</sup> model of treatment and recovery: 1–2 = early and late stages of engagement, 3–4 = stages of persuasion, 5–6 = stages of active treatment, and 7–8 = stages of relapse prevention and recovery. This model prescribes, first, that clients are first engaged in a working alliance (engagement stage); second, that they are helped to develop motivation for abstinence (persuasion stage); third, that they participate in actively eliminating substance abuse (active treatment stage); and finally, that they continue to address their vulnerability to relapse and pursue other goals in their lives (relapse prevention stage). Both assertive community treatment and standard case management teams used this stagewise approach in helping clients move through the substance abuse recovery process.

To establish consensus ratings of substance abuse, a team of 3 independent raters, blind to study condition, considered all available data on substance use disorder (from interview rating scales, clinician ratings, and urine drug screens) to establish separate ratings on the AUS, DUS, and SATS scales, following procedures validated previously.<sup>47</sup> In practical terms, clients reported their substance use accurately after the first 2 years of the study, and clinician ratings and urine drug screens added little or no information. To determine the interrater reliabilities, researchers independently rated a randomly selected subgroup of 32% of the participants. Intraclass correlation coefficients were high for all 3 scales: .94 on the AUS, .94 on the DUS, and .93 on the SATS.

### *Recovery Outcomes*

To assess recovery, we examined several different domains of outcome (symptoms of schizophrenia and of substance use disorder, aspects of adult role performance, and quality of life) and, with the help of several persons in recovery from dual diagnosis on our research team and on our advisory board, selected 6 variables and cut-points that clients believed indicated actively taking control of one’s life. Several dual diagnosis clients in recovery and researchers shared in this consensus process. The choice of measures was limited to those contained in the full assessment battery of the original research grant, and thus we were unable to assess many aspects of recovery considered important by clients. Although the dual diagnosis clients on our advisory board did not specifically identify sustained abstinence as a recovery outcome, we also tracked abstinence as an indicator of substance abuse recovery.

Recovery outcomes and cutoffs were defined as follows: (1) For psychiatric symptoms, absence of clinically significant symptoms (no BPRS subscale average > 3) indicates that the individual has learned to control symptoms using medications and other strategies. (2) For substance abuse, having attained the late active treatment stage or better (SATS > 5) indicates that the individual has attained a clinically meaningful remission and is actively pursuing long-term abstinence. (3) For community integration, independent housing (> 80% of days residing in one’s own housing) means the individual is not just avoiding institutionalization and homelessness but is living independently and is responsible for rent and housing decisions. (4) Competitive employment (a competitive job in the past year) means working in a job that is in an integrated work setting, that pays at least minimum wage, and that is contracted to the individual directly rather than to a program or mental health agency. (5) Because many dually diagnosed clients report that the key challenge for recovery is making friends who are not substance abusers, we used regular contact (at least weekly) with friends who are not substance abusers as a measure of social recovery. (6) Finally, expressing general satisfaction with one’s life is an indicator of quality of life (> 5 on the 7-point QOLI global satisfaction rating). As a summary of an individual’s recovery, we added together the number of scores above threshold on these 6 items.

### *Data Analysis*

First, to examine the course of change, we plotted the mean score of each outcome over the 10-year study period. The time effects were modeled with generalized estimating equation (GEE) methods<sup>48</sup> using the SAS Proc Genmod procedure.<sup>49</sup> All analyses were based on the baseline and the yearly follow-up assessments (mid-year assessments during the first 3 years were excluded). Analyses for days of hospital stay, 3 living situation

variables (jail/prison, homelessness, and independent living), and competitive work status were based on yearly intervals. All other analyses were based on the past 6 months. Second, the relationships among the 6 major outcomes were assessed with simple bivariate correlations after averaging each participant's scores for the 11 assessment points. Third, to assess improvements in recovery scores over time (from 0 to 10 years and from 3 to 10 years), we used within-sample *t*-tests. Note that similar findings for the 0–3 year interval have been reported previously.<sup>35</sup>

## Results

### Baseline Characteristics

Table 1 shows baseline characteristics of the 130 participants with schizophrenia or schizoaffective disorder who completed 10 years in the study and thus form the core group for these analyses. They tended to be young, Caucasian, male, high school educated, and never married. Because these clients were in the public mental health system due to severe and persistent mental illness, they had been ill for a considerable length of time (on average, 12 years with mental illness and 15.6 years with substance abuse). They abused the substances that were most prevalent in New Hampshire at the time (alcohol = 83.0%, cannabis = 48.1%, and cocaine = 14.0%). On average, substance abuse began more than 3 years before first psychiatric contacts.

**Table 1.** Baseline Characteristics for 130 Patients With Schizophrenia or Schizoaffective Disorder and Co-Occurring Substance Use Disorder

Variables	Mean/ Count	SD/ Percent
Age (years)	32.2	6.8
Race (white)	125	96.2%
Sex (male)	99	76.2%
Marital (never married)	91	70.0%
Education (completed high school or higher)	83	63.9%
Age at First Psychiatric Encounter	20.2	6.4%
Diagnosis		
Schizophrenia	91	70.0%
Schizoaffective Disorder	39	30.0%
Age of Onset for Alcohol or Drug Abuse	16.6	4.7
Substance Use Disorder		
Current Alcohol Use Disorder (present)	107	83.0%
Current Cannabis Use Disorder (present)	62	48.1%
Current Cocaine Use Disorder (present)	18	14.0%
Other Drug Use Disorder (present)	23	17.8%

### Ten-Year Outcomes

To control for multiple tests, we interpret “significant” differences at  $p < .01$  and “marginal” differences at  $p < .05$ . Table 2 shows that the participants improved in nearly all areas over 10 years, and much of this improvement, especially for substance abuse, occurred during years 3 to 10.

Although participants entered the study as outpatients rather than during an episode of illness or hospitalization and were therefore relatively stable, their psychiatric symptoms, particularly symptoms of thought disorder and mood, improved significantly over time. However, cognitive disorganization did not improve over time.

Participants improved dramatically in terms of substance abuse: at the 10-year follow-up, 65% had no signs of abuse or dependence, and 39% had been abstinent for at least 6 months. Table 2 shows analyses for the full study group, but separate analyses restricted to those with an alcohol diagnosis or those with a drug diagnosis (not shown) revealed that time effects on alcohol or drug measures were highly significant for the respective subgroups on all measures.

Measures of living situation show significant reductions in rates of hospitalization and homelessness and significant increases in independent living days. Episodes of incarceration did not change, but remained at low levels throughout the 10 years.

The most dramatic functional improvements were in the area of competitive employment. Total amount of social contacts and daily activities actually decreased significantly, and family contacts decreased marginally over 10 years. At the same time, however, clients steadily increased their rates of employment and of regular contacts with non-substance-abusing friends.

Participants reported greater satisfaction with their lives overall, and the gains in specific areas of quality of life were either marginal (social relations and family relations) or significant (leisure), with the exception of housing, where satisfaction started high and remained so.

Table 2 also shows that participants continued to improve in many areas of outcome between the 3-year follow-up (the end of experimental interventions) and the 10-year follow-up. Significant improvements occurred during this interval in overall BPRS symptom scores, BPRS affect score, most of the substance abuse measures, hospital stays, competitive jobs, and satisfaction with leisure activities.

### Recovery Outcomes

Figure 1 shows that participants improved on each of the 6 measures identified as recovery outcomes over the 10 years. Active control of substance abuse, having regular contacts with non-abusers, and competitive employment show the most dramatic improvements over time, in part because recovery scores in these areas were uniformly low

**Table 2.** Ten-Year Outcomes for Patients With Schizophrenia or Schizoaffective Disorder and Substance Use Disorder

Variables	Baseline Mean (SD)/ Count (%) N = 130	1 Year Mean (SD)/ Count (%) N = 130	2 Year Mean (SD)/ Count (%) N = 129	3 Year Mean (SD)/ Count (%) N = 130	4 Year Mean (SD)/ Count (%) N = 124	5 Year Mean (SD)/ Count (%) N = 125	6 Year Mean (SD)/ Count (%) N = 123	7 Year Mean (SD)/ Count (%) N = 122	8 Year Mean (SD)/ Count (%) N = 120	9 Year Mean (SD)/ Count (%) N = 119	10 Year Mean (SD)/ Count (%) N = 116	Level of Significance for Time Effect	
												0–10 Years	3–10 Years
Symptoms of Schizophrenia and Schizoaffective Illness													
BPRS <sup>a</sup> Total Score	47.93 (14.19)	43.80 (12.27)	43.61 (11.53)	42.55 (12.18)		40.96 (12.35)	38.83 (9.67)	38.78 (10.85)	39.54 (11.10)	39.01 (11.25)	39.34 (10.79)	**	**
BPRS Affect	2.46 (1.05)	2.35 (1.03)	2.52 (1.07)	2.39(1.12)		2.31 (1.15)	2.24 (1.06)	2.17 (1.10)	2.10 (0.95)	2.08 (1.04)	2.04 (0.97)	**	**
BPRS Anergia	2.05 (1.08)	1.79 (1.03)	1.77 (1.03)	1.63 (0.91)		1.54 (0.81)	1.54 (0.80)	1.68 (0.86)	1.71 (0.86)	1.67 (0.86)	1.73 (0.90)	**	ns
BPRS Thought Disorder	2.79 (1.56)	2.43 (1.39)	2.31 (1.52)	2.31 (1.40)		2.12 (1.38)	1.91 (1.05)	1.93 (1.11)	2.07 (1.21)	2.03 (1.26)	2.08 (1.29)	**	ns
BPRS Disorganization	1.36 (0.75)	1.23 (0.60)	1.18 (0.46)	1.25 (0.58)		1.24 (0.62)	1.20 (0.49)	1.17 (0.50)	1.25 (0.64)	1.14 (0.43)	1.22 (0.52)	ns	ns
BPRS Activation	1.53 (0.67)	1.45 (0.79)	1.36 (0.65)	1.32 (0.57)		1.35 (0.69)	1.30 (0.56)	1.32 (0.63)	1.26 (0.48)	1.28 (0.46)	1.30 (0.57)	**	ns
Substance Abuse AUS <sup>b</sup>	3.27 (1.02)	2.77 (1.08)	2.63 (1.06)	2.53 (1.10)	2.49 (1.15)	2.47 (1.12)	2.25 (1.25)	2.28 (1.34)	2.07 (1.27)	2.15 (1.35)	1.97 (1.19)	**	**
Days of Alcohol Use	60.76 (60.98)	41.60 (51.25)	32.71 (44.73)	37.02 (52.84)	36.46 (53.80)	38.80 (55.77)	31.78 (51.32)	31.82 (57.35)	29.77 (56.33)	29.62 (52.83)	17.64 (44.36)	**	**
ASI Alcohol Composite <sup>c</sup>	0.25 (0.22)	0.20 (0.20)	0.20 (0.20)	0.18 (0.20)	0.19 (0.20)	0.17 (0.22)	0.15 (0.21)	0.18 (0.21)	0.13 (0.19)	0.16 (0.20)	0.14 (0.18)	**	*
DUS <sup>d</sup>	2.43 (1.23)	2.22 (1.18)	2.05 (1.17)	2.12 (1.12)	2.20 (1.22)	2.16 (1.17)	1.86 (1.07)	1.83 (1.11)	1.79 (1.17)	1.73 (1.06)	1.77 (1.12)	**	**
Any Drug Use (yes)	67 (59%)	66 (54%)	64 (50%)	66 (51%)	61 (50%)	51 (41.80%)	45 (37%)	46 (38%)	36 (31%)	32 (34%)	16 (29%)	**	**
ASI Drug Composite—Dichotomized (yes) <sup>e</sup>	85 (68%)	69 (56%)	73 (58%)	71 (58%)	58 (49%)	69 (58%)	58 (51%)	53 (49%)	60 (52%)	50 (50%)	58 (55%)	**	ns
Remission <sup>f</sup> Past 6 Months	2 (2%)	45 (35%)	54 (42%)	56 (43%)	59 (48%)	59 (48%)	61 (52%)	64 (55%)	69 (60%)	71 (60%)	73 (65%)	**	**
Abstinence <sup>g</sup> Past 6 Months	2 (2%)	12 (9%)	15 (12%)	20 (16%)	29 (24%)	24 (20%)	36 (31%)	34 (29%)	44 (38%)	48 (41%)	44 (39%)	**	**
SATS <sup>h</sup>	2.87 (1.04)	3.9 (1.40)	4.36 (1.60)	4.91 (1.74)	4.66 (2.27)	4.82 (2.24)	5.42 (2.01)	5.66 (2.37)	5.94 (2.30)	6.03 (2.35)	6.09 (2.28)	**	**
Living Situation													
Hospital Stay Past Year (yes)	64 (52%)	49 (41%)	49 (39%)	49 (39%)	44 (35%)	40 (33%)	35 (28%)	29 (23%)	27 (22%)	17 (14%)	24 (20%)	**	**
Jail/Prison Stay Past Year	13 (10%)	15 (12%)	15 (12%)	15 (12%)	9 (7%)	10 (8%)	13 (10%)	10 (8%)	10 (8%)	9 (7%)	10 (9%)	ns	ns
Homeless Past Year (yes)	34 (27%)	26 (20%)	13 (10%)	14 (15%)	20 (16%)	17 (14%)	7 (6%)	13 (10%)	8 (6%)	8 (7%)	11 (9%)	**	*
Proportion of Days of Independent Living Past Year <sup>i</sup>	0.49 (0.43)	0.50 (0.42)	0.49 (0.37)	0.45 (0.43)	0.58 (0.45)	0.61 (0.43)	0.59 (0.44)	0.64 (0.44)	0.61 (0.46)	0.59 (0.45)	0.61 (0.45)	**	*

Table 2. Continued

Variables	Baseline Mean (SD)/ Count (%) N = 130	1 Year Mean (SD)/ Count (%) N = 130	2 Year Mean (SD)/ Count (%) N = 129	3 Year Mean (SD)/ Count (%) N = 130	4 Year Mean (SD)/ Count (%) N = 124	5 Year Mean (SD)/ Count (%) N = 125	6 Year Mean (SD)/ Count (%) N = 123	7 Year Mean (SD)/ Count (%) N = 122	8 Year Mean (SD)/ Count (%) N = 120	9 Year Mean (SD)/ Count (%) N = 119	10 Year Mean (SD)/ Count (%) N = 116	Level of Significance for Time Effect	
												0–10 Years	3–10 Years
Functional Status													
Competitive Job Past Year (yes)	8 (6%)	19 (15%)	19 (15%)	32 (25%)		40 (34%)	37 (29%)	29 (24%)	38 (32%)	42 (35%)	48 (41%)	**	**
Social Contact With Non- Abusers (yes)	9 (7%)	44 (34%)	51 (40%)	48 (39%)		45 (38%)	53 (45%)	52 (46%)	55 (47%)	51 (45%)	53 (49%)	**	*
QOL <sup>f</sup> Daily Activities (0–1)	0.50 (0.15)	0.49 (0.13)	0.47 (0.16)	0.47 (0.16)		0.51 (0.13)	0.51 (0.14)	0.49 (0.14)	0.47 (0.13)	0.47 (0.14)	0.48 (0.13)	**	ns
QOLI Social Contact (1–5)	2.75 (0.83)	2.84 (0.82)	2.80 (0.86)	2.75 (0.90)		2.70 (0.86)	2.72 (0.83)	2.68 (0.78)	2.57 (0.87)	2.53 (0.80)	2.55 (0.94)	**	**
QOLI Family Contact (1–5)	3.32 (0.89)	3.31 (1.01)	3.28 (0.92)	3.18 (0.91)		3.24 (1.07)	3.32 (0.96)	3.14 (1.02)	3.11 (1.04)	3.06 (1.03)	3.08 (1.07)	*	ns
Quality of Life <sup>j</sup>													
QOLI General Life Satisfaction <sup>k</sup>	4.11 (1.47)	4.38 (1.35)	4.44 (1.46)	4.46 (1.35)		4.73 (1.25)	4.73 (1.30)	4.59 (1.38)	4.75 (1.32)	4.80 (1.25)	4.71 (1.28)	**	*
QOLI Satisfaction With Housing	4.86 (1.10)	5.00 (1.09)	5.12 (1.00)	5.00 (1.05)		5.12 (1.09)	5.12 (1.07)	5.14 (1.00)	5.05 (1.14)	5.18 (1.05)	4.98 (1.15)	ns	ns
QOLI Satisfaction With Social Relations	4.45 (1.20)	4.54 (1.16)	4.45 (1.17)	4.58 (1.14)		4.63 (1.10)	4.70 (1.15)	4.68 (1.11)	4.67 (1.03)	4.76 (1.08)	4.59 (1.17)	*	ns
QOLI Satisfaction With Family Relations	4.52 (1.49)	4.66 (1.38)	4.77 (1.34)	4.74 (1.27)		4.84 (1.29)	4.86 (1.31)	4.85 (1.35)	4.84 (1.22)	4.99 (1.21)	4.78 (1.41)	*	ns
QOLI Satisfaction With Leisure	4.33 (1.25)	4.54 (1.22)	4.59 (1.15)	4.48 (1.22)		4.65 (1.02)	4.56 (1.04)	4.59 (1.11)	4.77 (1.01)	4.78 (0.99)	4.70 (1.09)	**	**
Recovery Score	1.34 (1.04)	1.97 (1.38)	2.07 (1.36)	2.34 (1.36)		2.85 (1.41)	3.15 (1.41)	3.14 (1.32)	3.35 (1.33)	3.17 (1.40)	3.37 (1.43)	**	**

<sup>a</sup>Brief Psychiatric Rating Scale (24–168)<sup>b</sup>Alcohol Use Scale (0–1)<sup>c</sup>Addiction Severity Index—Alcohol Composite (0–1)<sup>d</sup>Drug Use Scale (1–5)<sup>e</sup>Addiction Severity Index—Drug Composite<sup>f</sup>Both AUS and DUS scores < 3<sup>g</sup>Both AUS and DUS scores = 1<sup>h</sup>Substance Abuse Treatment Scales (1–8)<sup>i</sup>Independent Living consists of the following residential settings: House/Trailer, Apartment, Rooming House, Family of Origin<sup>j</sup>Quality of Life Interview<sup>k</sup>QOLI Satisfaction Scales (1–7)\**p* < .05; \*\**p* < .01.

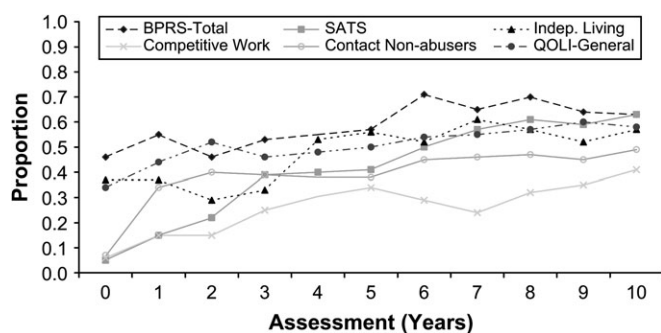


Fig. 1. Patterns of 6 Indicators of Recovery Over Time (N = 130).

at the beginning of the study. While not shown in Figure 1, 6-month abstinence also improved steadily over time (Table 2).

Table 3 shows a correlation matrix based on the 6 recovery outcomes (averaged over 10 years) to illustrate the relationships between different domains of outcomes. Most of the relationships are in the expected directions but not significant. Competitive work and quality of life were significantly associated with fewer overall symptoms ( $p < .01$ ). Several other relationships were marginally significant ( $p < .05$ ).

Table 3 uses average outcome scores over 10 years, but cross-sectional correlations at 3 years and at 10 years showed similar low correlations. At 3 years, the only additional significant correlation was a positive relationship between SATS score and contact with non-abusers ( $r = .25$ ,  $p < .01$ ). At 10 years, no additional correlations were significant. Although not shown in Table 3, we also examined relationships between abstinence and the other non-substance abuse variables. Each of these correlations was nonsignificant, with the exception of a marginal correlation between abstinence and general life satisfaction ( $p = .05$ ).

The relative independence of outcomes in Table 3 and in cross-sectional analyses indicates that recovery is a multidimensional concept. In other words, recovery in one domain does not necessarily transfer to other domains. Adding items above threshold together to form a composite recovery outcome score showed highly significant improvements over time (for change from the baseline to 10 years,  $t = 13.1$ ,  $df = 95$ ,  $p < .001$ ; for change from 3 years to 10 years,  $t = 5.27$ ,  $df = 90$ ,  $p < .001$ ). As Figure 2 illustrates, at baseline the modal recovery score was 1 (out of 6), at 3 years it was 2, and by 10 years it was 4.

## Discussion

The 10-year outcomes for participants with schizophrenia and co-occurring substance abuse were positive for large proportions. Despite severe and prolonged disability, many of these individuals were able to achieve control of both disorders, to reduce episodes of hospitalization and homelessness, to live independently, to achieve suc-

cess in several aspects of community functioning, and to attain what they perceived as a better quality of life.

The 10-year results also document steady and significant improvements between 3 and 10 years. At 3-year follow-up, most participants had not achieved the clinical cutoffs taken as indicators of recovery in several areas,<sup>35</sup> but by 10 years a majority had achieved these levels on at least 4 of 6 recovery outcomes. Not only did participants continue to improve in outcomes between 3 and 10 years in most areas, but they also improved in some areas (independent living and satisfaction with leisure activities) that had seemed static at 3 years. Thus, the evidence here suggests that improvements and recovery progress over many years, not just during the early stages of dual diagnosis treatment.

Amounts of activities, social contacts, and family contacts actually decreased as participants learned to manage mental illness and substance abuse and as they attained independent living, employment, and friendships with non-substance abusers. These findings are consistent with qualitative studies of the recovery process among persons with co-occurring disorders.<sup>50,51</sup>

The concept of mental health recovery continues to be difficult to define and measure. For the current analysis, we have taken the position that recovery outcomes should correspond to meaningful behaviors identified by dual diagnosis clients themselves. For example, people with co-occurring mental illness and substance abuse report that having regular contacts with friends who do not abuse substances, rather than increasing the size of their social networks or their overall amounts of social contact, is a meaningful social outcome. We used clients' advice to select recovery outcomes, but we readily acknowledge that the operational definitions used here were idiosyncratically determined by the clients who collaborated with us on this study and were limited by the variables available in our data. Since our recovery outcomes did not include sustained abstinence (a common standard in the substance abuse field), we analyzed abstinence separately and documented similar results—steady progress over time and minimal relationships with other domains.

The observed weak relationships between outcomes from multiple domains indicate that the domains are relatively independent. The only strong relationship was between high psychiatric symptoms and poor life satisfaction. Our findings regarding weak relationships between outcomes are consistent with many years of schizophrenia research. For example, Strauss and Carpenter<sup>52</sup> and Gurel and Lorei<sup>53</sup> documented similar weak relationships among outcome domains for schizophrenia clients many years ago. To these previous findings, we have added the observation that substance abuse (including sustained abstinence) and quality of life outcomes are also relatively independent of the other outcome domains.

**Table 3.** Pearson Product Moment Correlations Between Mean Indicators of Recovery for Schizophrenia or Schizoaffective Patients Over 10 Years (N = 130)

	BPRS Total Score	SATS	Independent Living	Contact With Non-Abusers	Competitive Work
SATS	-.10	—			
Proportion of Days of Independent Living	-.03	-.022*	—		
Frequency of Social Contact With Non-Abusers	-.021*	.16	.20*	—	
Competitive Work	-.024**	-.05	.12	.22*	—
QOLI-General Life Satisfaction	-.053**	.15	-.11	.20*	.08

Note: BPRS = Brief Psychiatric Rating Scale; QOLI = Quality of Life Inventory; SATS = Substance Abuse Treatment Scale.

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

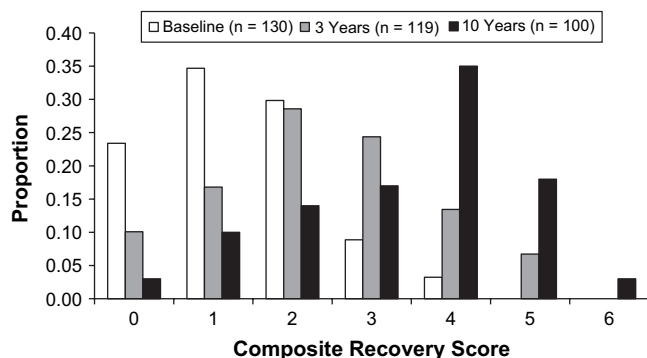
The relationships between treatment and recovery are unclear in this study, other than that hospitalization declines steadily over time as recovery improves. Our 3-year follow-up data showed that nearly all participants were rapidly engaged in outpatient dual diagnosis services and that hospital use and homelessness were reduced over time as people increased their use of outpatient services.<sup>35</sup> The data indicated, however, that these participants continued to require substantial outpatient treatments and supports to remain out of institutional settings over 3 years. Quality of services and specific services were also important. In centers where the assertive community treatment and integrated treatment model were implemented with high fidelity, substance abuse outcomes were much better than in centers with poor implementation.<sup>54</sup> Further, schizophrenia clients who received clozapine during the early years of the study experienced highly significant improvements in substance abuse outcomes compared with those on other antipsychotic medications.<sup>55</sup> We have not yet analyzed service

data for years 3 to 10, but relationships between services during the first 3 years and 10-year outcomes reported here were not significant.

Including subjective measures of quality of life is somewhat controversial because these measures tend to be stable over time as people readjust their own expectations.<sup>56</sup> However, we found improvements in reported overall life satisfaction and also in specific areas of quality of life. Other attitudinal concepts that are often identified by clients and could be considered to be indicators of recovery include hope, self-esteem, and empowerment.<sup>27</sup>

Several caveats deserve mention. This study group did not approximate a representative sample of people with schizophrenia and substance abuse, though it was representative of those in treatment in the New Hampshire state mental health system around 1990. Further, the New Hampshire mental health system was atypical in offering comprehensive integrated dual disorders treatment during the early 1990s. Many state systems are, however, currently implementing integrated treatment programs.<sup>57</sup>

The longitudinal improvements reported here cannot be attributed to integrated dual disorders treatment. Other possible explanations include regression to the mean, the natural course of dual disorders, and temporal changes. For example, the findings regarding competitive employment and regular contacts with non-substance abusers might be explained by the emphasis on supported employment and self-help that began during these years in New Hampshire. In fact, the increases in competitive employment for this study group were remarkably similar to the overall increases in New Hampshire for the population of persons with severe mental illness during the same years. Regression to the mean offers an unlikely explanation for changes that were steady over many years. On the other hand, it is certainly possible that improvements in recovery outcomes are characteristic of the



**Fig. 2.** Proportion of Composite Recovery Scores at Baseline, 3 Years, and 10 Years for Schizophrenia and Schizoaffective Patients With Co-Occurring Substance Use Disorders (N = 130).



natural course of co-occurring disorders since both schizophrenic and substance use disorders individually tend toward such a positive course with age.

Despite these caveats, the data presented here provide a hopeful long-term picture for clients with co-occurring schizophrenic and substance use disorders. The long-term course for most people with these disorders, at least in New Hampshire, appears to involve steady remission of symptoms of both disorders, steady improvements in key areas of independent role functioning, and steady gains in quality of life and overall life satisfaction.

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