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Corrections, and Emergency Shelter Systems:
The New York-New York Initiative**

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The Impact of Supportive Housing for Homeless People with Severe Mental Illness on the Utilization of the Public Health, Corrections and Emergency Shelter Systems: The New York-New York Initiative¹

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Abstract

Data on 4,679 homeless people with severe mental disorders placed in supportive housing in New York City between 1989 and 1997 were merged with administrative data on the utilization of public shelters, public hospitals, Medicaid-funded services, veterans' inpatient services, state psychiatric inpatient services, state prisons, and the city's jails. A series of matched controls who were concurrently homeless but were not placed in housing were similarly tracked through administrative records.

Adjusting for demographic and other pre-intervention differences between the cases and controls, regression results reveal that homeless people placed in supportive housing experience marked reductions in shelter use, hospitalizations (regardless of type), length of stay per hospitalization, and time incarcerated. Prior to placement in housing, homeless people with severe mental illness used an average of \$40,449 per person per year in such services (in 1999 dollars). Placement in housing through the New York/New York program (NY/NY) was associated with a reduction in service use of \$16,282 per housing unit per year, adjusting for concurrent changes in the controls' service use patterns. Unit costs per year for the supportive housing are estimated at \$17,277, which would result in a modest cost of \$995 per unit per year over the first two years of placement. Overall, the NY/NY initiative, which included some licensed community mental health residences as well, resulted in a net cost of \$1,908 per unit per year, or \$6.9 million. The potential benefits and challenges of further public investment in supportive housing for homeless people with severe mental disabilities are discussed.

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Introduction

Placing homeless people with severe mental illness (SMI) into subsidized permanent housing with social service support promises to substantially reduce the demand for shelter among those placed. This housing provides a more humane alternative to living on the streets and in shelters, and providers report retention rates in such housing to be upwards of 70 percent in the first year after placement. However, little empirical evidence exists to quantify the degree to which supportive housing supplants shelter use among the formerly homeless with SMI. Furthermore, it can similarly be assumed that homeless people with SMI, once placed into supportive housing, reduce their use of acute psychiatric and medical services, and get arrested and incarcerated less often. However, such assumptions are somewhat more tenuous, and a similar dearth of empirical evidence exists on both the demand for these services among homeless people with SMI, and the impact of supportive housing on this level of demand.

The study reported here examined service use by formerly homeless people with SMI before and after being placed into “New York/New York” (NY/NY) housing, a large housing program in New York City (NYC). Administrative data from public health, psychiatric, criminal justice, and shelter service providers are used to assess the aggregate level of service demand, pre- and post-intervention, for the study group and for a matched set of controls. The extent to which reductions in services are present and are attributable to a NY/NY housing placement is assessed, and the degree to which service reductions offset supportive housing costs is measured.

Background

In 1990, New York State (NYS) and NYC agreed to jointly fund and develop 3,600 community-based permanent housing units for homeless individuals with SMI under what became known as the New York/New York agreement to House the Homeless Mentally Ill (Hevesi 1999; Kennedy 1995, 1997). This initiative was in response to problems with homelessness and community mental health services in NYC that were perceived to have reached crisis proportions. The NY/NY agreement was designed to target those who were among the most chronic and difficult to serve among the homeless population and to ease demand on public shelter and psychiatric treatment services.

The agreement provided housing and psychosocial services in a variety of configurations that are collectively known as NY/NY housing. Housing under NY/NY can be grouped under two general models. The first, Supportive Housing, includes scattered-site housing with community-based service support and single room occupancy (SRO) housing (independent housing linked to either community-based or site-based service support). The second, Community Residence facilities, include community residences, long-term treatment facilities, and adult homes (Lipton et al. 2000; Center for Urban Community Services 1995). In general, Supportive Housing emphasizes “normality” in housing in terms of separating services from housing arrangements and giving tenants choice in determining the nature of their housing arrangements and mental health service regimens. In contrast, Community Residences take a more clinical approach that integrates the delivery of housing and services by having services available on site and participation mandated by the residence agreement. Supportive Housing maintains that such

“normal” housing is appropriate for individuals with mental illness regardless of the severity of impairment, while the Community Residence model places people in increasingly less restrictive living arrangements as they progress through their treatment regimens (Carling 1993; Bebout and Harris 1992).

To be eligible for this housing, tenants must have a diagnosis of severe mental illness and have spent a recent period of time homeless in shelters or “on the streets.” After going through an application and assessment with the NYC Human Resources Administration to determine eligibility for NY/NY housing, the prospective tenant then applies through one of the nonprofit agencies that administer the housing units funded under the agreement. Thus NY/NY eligibility, housing availability, agency eligibility guidelines, and tenant preference all factor into the housing placements provided under the agreement.

Literature Review

Studies that focus on supportive housing interventions for homeless individuals with mental illness consistently find high rates of retention in those programs. Lipton, Nutt, and Sabatini (1988) followed 49 homeless people with mental illness, half of whom were provided program housing. After one year, they found that 69 percent of the experimental group was living in permanent housing, as opposed to 30 percent of the control group. Drake et al. (1997) similarly report improved housing outcomes for a group of dually diagnosed² homeless people who were provided residential treatment, compared with a control group given standard treatment. Murray et al. (1997), Caton et al. (1993), and Huffman (1993) all report high rates of housing retention for participants of transitional and/or continuum model programs, although none of the studies included comparable control groups.

Ridgway and Rapp (1998), in the most comprehensive review of supportive housing studies to date, report that supportive housing for homeless individuals with mental illness reduced homelessness and improved housing stability among program participants. Research from a McKinney Demonstration Program (Center for Mental Health Services 1994), in which the National Institutes of Mental Health sponsored five supportive housing projects in four cities, found increased rates of stable housing among the experimental groups—formerly homeless people with mental illness who received supportive housing and case management services—compared with similar groups of controls who were provided with standard treatment services (Shern et al. 1997).

In the San Diego McKinney project, Hurlburt, Wood, and Hough (1996) report on 362 people who were homeless and severely mentally ill and who were randomly assigned into four groups that varied federal Section 8 rental subsidies and case management services. They found that the Section 8 manipulation had a dramatic impact on subsequent housing stability, while the enhanced case management manipulation had no significant impact. Only 30 percent of the study participants who did not receive a rent subsidy achieved “stable independent living,” compared with 57 percent of those who received the rent subsidy.

² In this paper, dually diagnosed refers to individuals with comorbid diagnoses of serious mental illness and substance abuse disorder.

Both Goldfinger et al. (1999) and Dickey et al. (1996) report on an initiative in Boston that provided two types of housing for homeless people with mental illness: independent apartments with community-based services and “evolving consumer households” where the tenants lived communally and with gradually diminishing levels of staff assistance. Three-quarters of the total subjects were stably housed at the end of the 18-month follow-up period. The subjects in the group homes had fewer days homeless than the supported housing group, but otherwise no significant differences in housing outcomes or services use was found (Goldfinger et al. 1999; Dickey et al. 1996).

Three studies have looked at the housing provided by the NY/NY agreement. Lipton et al. (2000) found that after one, two, and five years, 75 percent, 64 percent, and 50 percent of the almost 3,000 individuals placed had retained their placement in the program across all types of NY/NY housing configurations. Tsemberis (Tsemberis 1999; Tsemberis and Eichenberg 2000) has also found high rates of housing retention by NY/NY recipients, but found that tenants of supportive housing units provided through NY/NY have a substantially higher retention rate after five years (88 percent) than do other programs provided through NY/NY (55 percent).

High tenant retention rates among housing interventions regardless of the particular configuration of services and housing has been a common finding in the housing programs examined so far. However, these similar outcomes belie the disparate costs involved in the two approaches. Community Residence models, with their incorporation of site-based staff and services that work exclusively with the tenants, have substantially higher associated service costs than do Supportive Housing models, which decouple residency and services use to a greater extent and whose tenants make greater use of existing services in the community. People with SMI could also be expected reduce their use of hospital services following a housing placement. People with housing who are receiving services would be in a better position to engage in regular outpatient regimens that could prevent the need for hospitalization. Furthermore, if they are hospitalized, access to housing and support could reduce the length of stay in a hospital. Salit et al. (1998), in a study of public hospital records in New York City, found homelessness to be associated with substantial excess stays and costs per hospital stay. Lewis and Lurigio (1994), in a study of state hospital patients living in Chicago, find that poor people with mental illness, when they seek psychiatric hospitalization, often do so more as a short-term housing arrangement than for psychiatric reasons. Rosenheck (2000) found, in a review of the literature, that enhancing services—either housing or case management—can generate reductions in the use of inpatient mental health services, especially among heavy hospital users. These reductions, however, may be at least partially be offset by increased use of outpatient services (Averyt and Kamis-Gould 2000) and by increased use of support services such as case management that are needed to effect such inpatient reductions (Rosenheck 2000).

This leads to the question of whether or not providing a service such as supportive housing to reduce homelessness among people with mental illness is cost effective. Rosenheck (2000) found that enhanced interventions cost more money than the cost savings they generate for all but the heaviest service users. However, studies of service utilization reductions and associated cost savings have typically focused on one type of service and on a single-service system, and have not integrated multiple systems and multiple providers in each system. Integrating costs accrued by homeless people across multiple providers in such systems as shelters, mental health services,

medical care, and criminal justice would allow for a more comprehensive assessment of the “cost of homelessness” from which to estimate cost savings. By tracking people across multiple systems, the estimated public expenses associated with homelessness would likely increase, as would the estimated reductions in service use following the receipt of targeted housing. Thus, greater cost effectiveness may be demonstrated.

Data and Methods

Data Sources

The data used in this study come from administrative databases that are maintained by eight different agencies. These databases are collected in computerized management information systems and track service utilization over time. They represent comprehensive banks of data on service users, both in their characteristics and their patterns of service use. Because these databases contain client identifiers, they can be linked across service systems to identify how services received through one system may affect service use in other systems. Administrative data are the only practical means for obtaining data on 1) a large number of homeless people 2) over an extended period of time, 3) with accurate data on consumption of services across multiple systems (Culhane and Metraux 1997).

Databases used for this analysis come from the following sources:

NYC Human Resources Administration, with records for 4,679 people either placed in housing developed under the NY/NY agreement or deemed eligible for NY/NY housing and placed in community-based housing. The database includes demographic and identifying information, and the date and type of housing for placements through 1997. No information on the duration of discrete NY/NY placements is available for this study.

NYC Department of Homeless Services (DHS), with records for all shelter users and shelter use since 1986 for its single adult shelter network.

NYC Office of Mental Health (OMH), with a database of lifetime records of inpatient stays in the state psychiatric hospital system for anyone who experienced an inpatient state hospital stay during the time period 1990 through 1996.

NYS Department of Health, Office of Medicaid Management (MA), with records of Medicaid-reimbursed inpatient and outpatient health care claims for people with records of shelter use and/or NY/NY housing placements for the years 1993 through 1997.

NYC Health and Hospitals Corporation (HHC), with records of inpatient stays in municipal hospitals between 1989 and 1996 for all people with a DHS shelter record.

U.S. Department of Veterans Affairs (VA), with records of inpatient stays in the VA hospital system between 1992 and 1999 for all people with records of DHS shelter utilization and/or a NY/NY placement.

NYS Department of Correctional Services (NYSDOCS), with a database on state prison utilization for people with a NY/NY housing placement and a set of control observations selected from the DHS shelter system. Data used in this study were from 1988 through April 15, 1997.

NYC Department of Corrections (NYCDOC), with a database on NYC jail utilization for people with a NY/NY housing placement, and a set of control observations selected from the DHS shelter system. Data used in this study were from 1988 through 1999.

The databases are merged by matching common identifiers found in each database. Merging is done on the basis of similarities in each database between five matching identifiers: first and last names, sex, date of birth, and Social Security number. Segments of the former four identifiers were combined to create a unique identifier that was used to match cases across databases. Social Security numbers (when available) were used to provide additional matches when the other identifiers were missing or contained erroneous data.³

Matched Control Groups

The analyses presented here estimate the changes in service use for people with NY/NY placements across these seven service systems. This is done by comparing each individual's history of service use in the two-year periods immediately before and immediately after his or her NY/NY placement. In addition, each person placed in NY/NY housing was matched to an individual control observation with similar characteristics, which allows for an assessment of what service use was like in the absence of a supportive housing placement. Because of the difficulty in consistently pairing case (i.e., NY/NY) and control observations with similar pre-intervention service use patterns across the seven service systems, different control groups were utilized for analyses of the different service systems. Appendix A contains a detailed overview of the sampling frames for the respective control groups.

In constructing the matched-pair control group for each analysis, observations for the control groups are selected based on similarities with specific control observations based on the following criteria: 1) demographics: gender, race (black/non-black), and age (ages of those in control pool are within five years of the case); 2) indicators of mental illness and substance abuse; for the DHS control group, these indicators are based on data from DHS records, and reflect the assessments of DHS social service staff and self-disclosure by shelter users at the intake interview (i.e., no standardized criteria for determining mental illness or substance abuse problems is used). for the OMH, HHC, MA, and VA control groups, these indicators are based on DSM diagnoses that accompany hospitalizations; and 3) similar service use for the two-year period up to the NY/NY placement date; this is based on number of stays and days spent in service facilities (i.e., shelter, hospital, or prison) during the two-year intervention period, and the length of time between last service use and NY/NY placement.

This case-control matching process has two parts. First, matching on elements of the first two groups of matching criteria (demographics and diagnosis indicators) limits the numbers of potential matches between each case observation and the pool of controls. Then, for each match, using the case observation's NY/NY placement date (which varies for each observation) as a surrogate intervention date for each potential control observation, the control observation with the most similar pattern of

³ Further details on this process are available from the authors.

pre-intervention service use (i.e., days and episodes for the two-year pre-intervention period) is selected to pair up with each case. For each case-control pair, the case observation's NY/NY placement date represents the point of intervention that separates pre- and post-intervention periods for both the case and the control observation.

Analysis Methods

Each analysis follows a parallel set of procedures. First, descriptive statistics on service use are provided that facilitate comparisons of raw pre- and post-intervention service use among the aggregate group with NY/NY housing placements. Second, descriptive statistics on pre- and post-intervention service use are provided for the case and control groups, with paired comparison t-tests used to assess whether the differences between groups and within groups across intervention periods are statistically significant. Following these two analyses, the effect of a NY/NY housing placement on the reduction in pre- to post-intervention service use, measured in days, is estimated employing multivariate least squares regression models, using a generalized estimating equations (GEE) methodology. With its use of maximum likelihood estimation and an iterative generalized least squares algorithm, GEE accommodates nonindependent observations such as matched pairs. Such a data structure normally violates assumptions associated with ordinary least squares (OLS) regression, but this approach corrects the attenuated standard error values that would otherwise result with using OLS regression (Allison 1999).⁴ In each regression model, the dependent variable is the difference across the pre- to post-intervention periods, for each observation, in the number of days accrued in each of the aforementioned service systems. The covariate of primary interest estimates the effect of getting a NY/NY placement, all other factors held constant. Along with this NY/NY covariate, the control variables in the models include the variables used to match the control groups; when applicable, a set of dichotomous variables to control for the year of NY/NY placement; a set of measures for pre-period service use that include service episodes, service days consumed, and (when available) cost of services;⁵ and measures of pre-period DHS shelter use.

⁴ Regression analyses were computed using GENMOD with the REPEATED option in SAS statistical software, version 8.1.

⁵ Measures of pre-period services use control for two phenomena: 1) the pre-requisite of having higher degrees of pre-intervention services to have higher differences in levels of pre-post services use and 2) the effects of prior services use on the likelihood of engaging in subsequent services use. These anticipated effects run counter to each other, as the former phenomena would associate higher pre-period services use with greater reductions in post-intervention use, and the latter would associate pre-period services use with lower or negative differences in pre-post services use. While this could lead to difficulty in interpreting the services use coefficients, it should control for these effects when considering the effects of NY/NY placement.

Results: System-Specific Effects

Use of DHS Shelter Services

Almost three-quarters of all people placed in housing under NY/NY have some record of having stayed in a DHS shelter at some point between 1987 and 1999.⁶ These 3,365 persons with DHS and NY/NY records were matched with control observations from the NYC DHS single adult shelter system and the resulting data set, with 3,338 matched pairs, provides the basis for a case-control comparison of shelter usage for two-year periods before and after the NY/NY intervention point. Twenty-seven case observations (0.8 percent) could not be matched with a control observation due to the values of the matching criteria being too dissimilar to those of any control observations.

The descriptive results (table 1) show a dramatic 85.6 percent pre-post placement decline in the mean number of shelter days used by individuals with NY/NY placements, from 137.0 days per placement to 19.8 days per placement. In the case-control comparison, the unadjusted case group decline (85.6 percent) is consistent with that of the entire NY/NY group and far outpaces the 6.4 percent unadjusted decline experienced by the controls. The pre-post declines for both groups are statistically significant (at $p < .01$) using paired comparison t-tests. In the pre-intervention period, the mean per-placement number of shelter days used among the cases is heavier ($p < .0001$) among the case group, but this relationship inverts in the post-intervention period ($p < .0001$) as the controls become, on average, the heavier shelter users.

In the regression model shown in table 2, the NY/NY placement is still associated with a 115.3-day reduction in shelter days used from the pre to the post-intervention period (95 percent confidence interval [c.i.] of 107.6 to 123.0 days) after controlling for other factors, especially heavy shelter use.⁷ Taking this 115.3-day reduction and averaging it over all 4,679 people with NY/NY placements yields an estimated reduction per NY/NY placement of 82.9 shelter days (95 percent c.i. of 77.4 to 88.5 days) over the two-year period.⁸ This represents, compared with the average pre-intervention shelter usage by the NY/NY placements (137.0 from table 1), an adjusted reduction of 60.5 percent.

⁶ Of the 4,679 people with NY/NY housing placements, 3,365 (71.9 percent) also had DHS shelter records even though all of them, by NY/NY eligibility criteria, must have been homeless prior to housing placement. Of those without shelter records, some may have used shelters not covered by the DHS database (approximately 20 percent of all NYC shelter beds), some may have used shelters outside of NYC, and some may have stayed exclusively in non-shelter (e.g., “street”) arrangements during their periods of homelessness.

⁷ Heavy shelter use is interpreted as a combination of two covariates in the model, “shelter days accrued” and “any shelter use.” These coefficients have opposite signs, meaning that the value of pre-intervention shelter days is associated with decreased reductions in the amount of post-intervention shelter days with few pre-intervention shelter days accrued, and increased reductions with many pre-intervention shelter days accrued (see footnote 5). Thus, if an observation had five pre-intervention shelter days, the combined coefficient of the coefficients “Shelter Days Accrued” and “Any Shelter Use” ($0.75 \times 5 - 34.48$) would be a post-period increase of 30.73 shelter days used (all else held equal), while a pre-intervention stay of 100 days ($0.75 \times 100 - 34.48$) would lead to a combined coefficient associated with a decrease of 40.52 shelter days used. Equilibrium here would be at 46 days.

⁸ This average is computed by dividing estimated aggregate reduction in shelter days attributed to NY/NY ($115.3 \times 3,365$) by the total number of NY/NY placements (4,679).

Table 1. Shelter Days Consumed by People in NY/NY Housing and Controls in Two-Year Periods Before and After NY/NY Intervention

	NY/NY (total 1989-97)	NY/NY (matched pair)	Controls (matched pair)
N	4,679	3,338	3,338
Total Service Users	3,365	3,338	3,338
Pre NY/NY Intervention (2 years)			
Total People w/ Shelter Records	2,786 (59.5 %)	2,750 (82.4 %)	2,265 (67.9%)
Total Days Sheltered	641,171	636,319	544,700
Mean Days (all people)	137.0	190.6	130.9
Mean Days (shelter users)	230.2	231.4	240.5
Post NY/NY Intervention (2 years)			
Total People w/ Shelter Records	782 (16.7%)	776 (23.2%)	1,754 (51.4%)
Total Days Sheltered	92,421	91,751	408,883
Mean Days (all people)	19.8	27.5	122.5
Mean Days (shelter users)	118.2	118.2	233.0

Notes: Between NY/NY and control groups, paired comparison t-tests assessing difference yield, for pre-intervention differences in shelter days, $t = 27.3$ (3,337 degrees of freedom and $p < .0001$) and, for post-intervention differences, $t = -26.2$ (3,337 degrees of freedom and $p < .0001$). Pre-post differences within the NY/NY group yields $t = 46.04$ (3,337 degrees of freedom and $p < .0001$) and within the control group yields $t = 2.6$ (3,337 degrees of freedom and $p < .01$), using paired comparison t-tests.

Table 2. Regression Model Estimating Effects on Changes in Shelter Days Used In the Two-Year Periods Preceding and Following the NY/NY Intervention (N = 3,338 matched pairs)

Covariate	Parameter Estimate (Days Saved)	Lower (95%) CI	Upper (95%) CI
Intercept	-44.13 ***	-61.35	-26.92
Received NY/NY Placement	115.33 ***	107.66	123.01
Shelter Days Accrued in 2-yr. Pre-Intervention Period	0.75 ***	0.72	0.78
Any Shelter Use in 2-yr. Pre-Intervention Period	-34.48 ***	-41.77	-27.19
NY/NY Placement in 1996-97	-24.83 ***	-36.32	-13.34
NY/NY Placement in 1994-95	-9.54	-19.97	0.89
NY/NY Placement in 1992-93	3.70	-6.35	13.76
NY/NY Placement Prior to 1992		reference category	
Age at NY/NY Placement	-0.12	-0.42	0.19
Male	-13.35 ***	-20.26	-6.44
Black Race	1.97	-4.72	8.67
DHS Mental Illness Indicator	-8.14 *	-15.06	-1.21
DHS Drug Use Indicator	0.02	-7.04	7.09

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

Use of OMH Inpatient State Psychiatric Hospital Services

Of the 2,396 people receiving a NY/NY placement in 1992 to 1994, 897 (37.4 percent) had some record of an inpatient OMH state hospital stay. Of this subgroup, 630 observations also had a record of DHS shelter use and were matched with DHS controls. These 630 case observations provided the basis for the OMH case-control analysis, with 570 (90.4 percent) of these observations matched with control observations selected from DHS shelter users.

Descriptive results of state hospital use, shown in table 3, show large reductions in pre-post state hospital use, measured in days, among the total NY/NY group (59.9 percent reduction) as well as among the more restricted case group (57.0 percent reduction). Looking at the case-control comparison, the pre-intervention state hospital use, measured in days, is (by design) very similar (i.e., with statistically nonsignificant differences). In contrast, the difference in post-intervention state hospital use is both substantial and statistically significant ($p < .0001$). Comparing within groups, the NY/NY shows significant pre-post reductions in state hospital use ($p < .0001$), while the reductions in state hospital days used are nonsignificant for the control group. Additionally, for the NY/NY group, far fewer people experienced post-intervention hospital episodes than in the control group, and the mean number of hospital days per hospitalized person also declined after the intervention. While individuals hospitalized also declined in the latter time period for the control group, the average number of days hospitalized increased substantially for those hospitalized in the control group.

Table 3. OMH State Hospital Days Consumed by People in NY/NY Housing and Controls in Two-Year Periods Before and After NY/NY Intervention

	NY/NY (total 1992-94)	NY/NY (matched pair)	Controls (matched pair)
N	2,396	570	570
Total Service Users	897	570	570
<u>Pre NY/NY Intervention (2 years)</u>			
Total People Hospitalized	634 (26.4%)	406	406
Total Days Hospitalized	137,215	78,250	78,940
Mean Days (all people)	57.3	137.3	138.5
Mean Days (hospital users)	216.4	192.7	194.4
<u>Post NY/NY Intervention (2 years)</u>			
Total People Hospitalized	353	240	335
Total Days Hospitalized	55,070	33,623	74,869
Mean Days (all people)	23.0	59.0	131.4
Mean Days (hospital users)	156.0	140.1	223.5

Notes: Between NY/NY and control groups, paired comparison t-tests assessing difference yield, among pre-intervention state hospital days, $t = -1.8$ (569 degrees of freedom and $p = .07$) and, for post-intervention differences, $t = -7.7$ (569 degrees of freedom and $p < .0001$). Pre-post differences within the NY/NY group yields $t = 9.3$ (569 degrees of freedom and $p < .0001$) and within the control group yields $t = -1.8$ (569 degrees of freedom and $p = .37$), again using paired comparison t-tests.

A multivariate regression model (table 4) shows that, holding other factors constant, a NY/NY placement is associated with a statistically significant estimated reduction of 75.3 days (95 percent c.i. of 55.7 to 95.0 days). Averaging this adjusted reduction for the case group across all the 2,396 NY/NY placements from 1992 to 1994 yields an estimated reduction of 28.2 days per NY/NY placement (95 percent c.i. of 20.8 to 35.6 days).⁹ Compared with the 57.3 days of mean pre-intervention state hospital use by the NY/NY group (table 3), this reflects a 49.2 percent adjusted reduction.

Table 4. Regression Model Estimating Effects on Changes in State Hospital Days Used In the Two-Year Periods Preceding and Following the NY/NY Intervention (N = 570 matched pairs)

Covariate	Parameter Estimate (Days Saved)	Lower (95%) c.i.	Upper (95%) c.i.
Intercept	-101.40 **	-165.69	-37.12
Received NY/NY Placement	75.33 ***	55.66	95.00
Days between Last Pre-Intervention OMH Exit and NY/NY Placement (Gap) ^a	0.16 ***	0.11	0.21
No Pre-Intervention Period OMH Inpatient Record	-70.49 ***	-99.90	-41.09
Hospital Days in Pre-Intervention Period	0.75 ***	0.66	0.83
Hospital Stays in Pre-Intervention Period	1.76	-15.19	18.70
Shelter Days in Pre-Intervention Period	-0.03	-0.09	0.03
NY/NY Placement in 1992	(reference category)		
NY/NY Placement in 1993	2.51	-17.51	22.53
NY/NY Placement in 1994	12.08	-9.98	34.15
Age at NY/NY Placement	0.42	-0.60	1.45
Male	-8.20	-26.98	10.59
Black Race	3.90	-15.15	22.94
295 Diagnosis (Schizophrenia)	-46.44 ***	-63.61	-29.26
296 Diagnosis (Affective Disorders)	-35.17 ***	-55.93	-14.41
Drug/Alcohol Dependency Diagnosis	-7.39	-25.84	11.07

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

^a For those with no pre-intervention OMH inpatient record, “gap” is set at 731 days.

Use of NYC Public Hospitals (HHC)

HHC granted access to inpatient hospital records from 1989 to 1996 for all individuals with a history of DHS shelter use. These parameters limit this analysis to the 1,984 people who had a NY/NY placement between 1991 and 1994 and who had a DHS shelter record. Of these people,

⁹ Estimated by multiplying 75.3 by the 897 people with both NY/NY placements and OMH records and then dividing by the 2,396 NY/NY placements in 1992-94. This assumes that the pre-post reduction in state hospital use is the same for NY/NY placements with shelter records and those without shelter records. Comparisons of these two subgroups (Metraux, Culhane, and Hadley 2000) indicates that OMH inpatient services use is in fact somewhat higher among non-shelter users in the pre-intervention period, and that this group has higher pre-post intervention period reductions compared with their counterparts with DHS shelter records. Thus, this 75.3-day reduction extrapolation for the non-shelter users is likely to be a conservative estimate.

855 (43.1 percent) had at least one record of inpatient hospitalization through HHC that was not reimbursed through Medicaid,¹⁰ and these observations were matched with controls selected from people who had both a DHS shelter record and at least one HHC hospitalization record. The resulting case-control group, consisting of 791 matched pairs (92.5 percent of those with HHC records), are utilized for further analysis on NY/NY housing placements and their impact on hospitalizations.¹¹

HHC hospital utilization, summarized in table 5, shows another substantial unadjusted pre-post placement decline for the NY/NY group. Among all NY/NY placements (first column), total users decline 68.6 percent from pre- to post-intervention period, while hospital days consumed declines even more sharply at 79.9 percent. Among the case-control groups (second and third columns), for the cases there is a similar pre-post decline in individuals hospitalized, 68.9 percent, and again a larger decline in days consumed, 78.0 percent. Comparatively for the controls, both the pre-post declines in people hospitalized and days consumed, 49.5 percent and 53.4 percent, respectively, are substantial but considerably lower than the declines for case observations. While the cases have a significantly higher pre-intervention number of hospital days used ($p < .01$), their number of post-intervention hospital days used is significantly lower than that of the control group ($p < .0001$).

Regression model results (table 6) show that, after controlling for differences in the included covariates, NY/NY placement is associated with a greater pre-post differential of 8.1 days (95 percent c.i. of 4.6 to 11.6 days). Averaging this 8.1-day reduction over the 1,984 observations results in a reduction of 3.5 days per placement (95 percent c.i. of 2.0 to 5.0 days).¹² Compared with the 16.5 days of mean pre-intervention HHC use by the NY/NY group (table 5), this reflects a 21.2 percent adjusted reduction.

¹⁰ Hospitalizations that are included in the both the HHC and Medicaid data sets (i.e., a Medicaid reimbursed inpatient stay occurring in an HHC hospital) are omitted from the HHC analysis and included in the subsequent Medicaid analysis.

¹¹ A separate analysis of hospital stays finds that more than three-quarters of the hospitalizations fall into nine Diagnosis Related Groups (DRG), all of which correspond to treatment for either mental health or substance abuse-related issues. The “Psychosis” DRG (430) alone accounts for more than half of all hospitalizations by individuals receiving NY/NY placements, during both the pre- and post-intervention periods (Metraux, Culhane, and Hadley 2000). DRG is a categorization system for hospital stays that are medically related with respect to diagnosis and treatment and that are statistically similar in length of hospital stay.

¹² Estimated by multiplying 8.1 by the 855 people with NY/NY placements, DHS records, and HHC records (from which the control group was selected) and then dividing by the 1,984 people with NY/NY placements and DHS records. For this analysis it is assumed that NY/NY placements without DHS shelter records have HHC hospital use patterns that are the same as those of the people with DHS records used in this case control analysis.

Table 5. HHC Hospital Days (non-Medicaid) Consumed by People in NY/NY Housing and Controls in Two-Year Periods Before and After NY/NY Intervention

	NY/NY-DHS (total 1991-94)	NY/NY (matched pair)	Controls (matched pair)
N (NY/NY Placements with Shelter Record)	1,984	791	791
Inpatient (non-Medicaid) HHC Record; 1989-96	855	791	791
<u>Pre NY/NY Intervention (2 years)</u>			
Total People Hospitalized	549 (27.7%)	515 (65.1%)	515 (65.1%)
Total Days Hospitalized	32,823	27,014	26,456
Mean Days (all people)	16.5	34.2	33.4
Mean Days (hospital users)	59.8	52.5	51.4
<u>Post NY/NY Intervention (2 years)</u>			
Total People Hospitalized	175 (8.8%)	160 (16.4%)	260 (32.9%)
Total Days Hospitalized	6,610	5,937	12,330
Mean Days (all people)	3.3	7.5	15.6
Mean Days (hospital users)	37.8	37.1	47.4

Notes: Between NY/NY and control groups, paired comparison t-tests assessing difference yield, for pre-intervention HHC hospital days, $t = -2.6$ (790 degrees of freedom and $p < .01$) and, for post-intervention differences, $t = 5.0$ (790 degrees of freedom and $p < .0001$). Pre-post differences yield, within the NY/NY group, $t = 15.2$ (790 degrees of freedom and $p < .0001$) and, within the control group, $t = 9.6$ (790 degrees of freedom and $p < .0001$), again using paired comparison t-tests.

Table 6. Regression Model Estimating Effects on Changes in HHC Hospital Days (non-Medicaid) Used In the 2-Year Periods Preceding and Following the NY/NY Intervention (N=791 matched pairs)

Covariate	Parameter Estimate (Days Saved)	Lower (95%) CI	Upper (95%) CI
Intercept	-12.67 *	-23.57	-1.77
Received NY/NY Placement	8.05 ***	4.55	11.55
Days between Last Pre-Intervention HHC Exit and NY/NY Placement (Gap)	0.03 ***	0.01	0.04
No Pre-Intervention Period HHC Inpatient Record	-15.31 ***	-20.39	-10.23
Hospital Days in Pre-Intervention Period	0.94 ***	0.87	1.01
Hospital Stays in Pre-Intervention Period	-1.34	-3.59	0.90
Shelter Days in Pre-Intervention Period	0.00	-0.01	0.01
NY/NY Placement in 1991	(reference category)		
NY/NY Placement in 1992	7.48 *	1.78	13.17
NY/NY Placement in 1993	3.17	-1.87	8.21
NY/NY Placement in 1994	5.73 *	0.58	10.87
Age at NY/NY Placement	-0.11	-0.28	0.07
Male	2.47	-1.06	6.00
Black Race	2.02	-1.25	5.29
295 Diagnosis (Schizophrenia)	-7.28 ***	-10.44	-4.11
296 Diagnosis (Affective Disorders)	-8.27 ***	-12.57	-3.96
Drug/Alcohol Dependency Diagnosis	-6.19 ***	-9.39	-2.99

Note: For those with no pre-intervention HHC inpatient record, “gap” is set at 731 days.

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

Use of Medicaid Reimbursed Inpatient and Outpatient Services

This analysis looks at claims records, both inpatient and outpatient, for medical and psychiatric health services that were eligible for reimbursement under New York State's Medicaid program.¹³ Medicaid data were available for the years 1993 through 1997. To provide full two-year pre- and post-intervention periods of claims records, only the cohort placed in NY/NY in 1995 and a set of matched controls were included in this analysis.

Inpatient Services. As has been the pattern, unadjusted inpatient service use reimbursed by Medicaid (table 7) drops substantially in the post-NY/NY placement period. Of the 733 people who were in the 1995 NY/NY cohort, 502 (68.5 percent) had a Medicaid claims record from 1993 to 1997. The percent of this cohort using inpatient services dropped 22.4 percent between the pre- and post-periods, while the number of inpatient days consumed dropped a more drastic 39.9 percent. Cost of services, also included in the Medicaid data, also drops proportionately.

Comparing the case and control groups, also in table 7, the case group's pre-post drop in service use is in contrast to virtually no change in the number of days used and costs accrued by the controls over this time. Compared with the controls, the cases have a significantly higher number of days consumed in the pre-intervention period ($p < .0001$; but nonsignificant cost differences) and a significantly lower number of post-intervention days consumed and costs accrued in the post-intervention period ($p < .001$).

Separate regression models are presented in table 8 for pre-post changes in days and costs. Controlling for all other factors in the model, a NY/NY placement is still significantly associated with pre-post reductions of 12.6 days (95 percent c.i. of 6.2 to 18.9 days) and \$7,983 (95 percent c.i. of \$4,608 to \$11,358). Averaged over the total number of NY/NY placements in 1995, this leads to an estimated reduction associated with a NY/NY placement of 8.6 days (95 percent c.i. of 4.2 to 13.0 days) and \$5,467 (95 percent c.i. of \$3,156 to \$7,779).¹⁴ These adjusted reductions reflect 24.4 percent and 31.9 percent declines from the mean pre-intervention levels of inpatient days used and costs accrued, respectively, by the overall group of NY/NY placements studied here.

¹³ The Medicaid inpatient claims data include hospital stays that are duplicated in the HHC database but are not used for the HHC analysis. Among the claims, more than three quarters of the health care services provided, in both outpatient and inpatient settings, involved a primary diagnosis involving either mental illness or substance abuse. The inpatient claims, which allow up to seven diagnoses, showed at least one diagnosis involving mental illness or substance abuse 92 percent of the time. More details are in Metraux, Culhane, and Hadley (2001a).

¹⁴ Estimated by multiplying the reductions in days and costs associated with NY/NY in the case group, 8.6 and \$5,467, respectively, by the 502 people with NY/NY placements and Medicaid inpatient records (from which the control group was selected) and then dividing by the 733 people with NY/NY placements in 1995.

Table 7. Inpatient Hospital Days Reimbursed by Medicaid for People in NY/NY Housing and Controls in Two-Year Periods Before and After NY/NY Intervention

	NY/NY (total 1995)	NY/NY (matched pair)	Controls (matched pair)
N	733	457	457
Medicaid Service Users	502	457	457
<u>Pre NY/NY Intervention (2 years)</u>			
Total People Hospitalized	406 (55.4%)	372 (81.4%)	372 (81.4%)
Total Days Hospitalized	25,892	21,157	19,210
Mean Days (all people)	35.3	46.3	42.0
Mean Days (hospital users)	63.8	56.9	51.6
Total \$\$ Billed to Medicaid	\$12,538,656	\$10,525,629	\$10,025,685
Mean \$\$ Billed (all people)	\$17,106	\$23,032	\$21,938
Mean \$\$ Billed (hospital users)	\$30,883	\$28,295	\$26,951
<u>Post NY/NY Intervention (2 years)</u>			
Total People Hospitalized	316 (43.1%)	280 (61.3%)	313 (68.5%)
Total Days Hospitalized	15,558	13,542	19,137
Mean Days (all people)	21.2	29.6	41.9
Mean Days (hospital users)	49.2	36.4	51.4
Total \$\$ Billed to Medicaid	\$8,070,885	\$7,109,844	\$10,738,287
Mean \$\$ Billed (all people)	\$11,011	\$15,558	\$23,497
Mean \$\$ Billed (hospital users)	\$25,541	\$19,112	\$28,866

Notes:

For number of inpatient days (non-HHC) reimbursed by Medicaid: Between NY/NY and control groups, paired comparison t-tests assessing difference yield, for the pre-intervention period, $t = -4.8$ (456 degrees of freedom and $p < .0001$) and, for post-intervention differences, $t = 3.7$ (456 degrees of freedom and $p < .001$). Pre-post differences yield $t = 6.0$ (456 degrees of freedom and $p < .0001$) within the NY/NY group and $t = 0.05$ (456 degrees of freedom and $p = .96$) within the control group, again using paired comparison t-tests.

For billing of inpatient days (non-HHC) reimbursed by Medicaid: Between NY/NY and control groups, paired comparison t-test assessing difference yield, for the pre-intervention period, $t = -1.3$ (456 degrees of freedom and $p = .20$) and, for the post-intervention period, $t = 4.5$ (456 degrees of freedom and $p < .0001$). Pre-post differences yield, within the NY/NY group, $t = 5.1$ (456 degrees of freedom and $p < .0001$) and, within the control group, $t = -0.84$ (456 degrees of freedom and $p < .40$), again using paired comparison t-tests.

Table 8. Regression Model Estimating Effects on Changes in Medicaid-Reimbursed Inpatient Hospital Days Used and Related Costs in the 2-Year Periods Preceding and Following the NY/NY Intervention (N=457 matched pairs)

Covariate	Stays Reduction (days)			Cost Reduction (\$s)		
	Parameter	95% c.i.		Parameter	95% c.i.	
	Estimate	Lower	Upper	Estimate	Lower	Upper
Intercept	5.67	-14.99	26.32	-807	-11,986	10,373
Received NY/NY Placement	12.56 ***	6.19	18.93	7,983 ***	4,608	11,358
Gap – Hospital to NY/NY Intervention	0.01	-0.01	0.04	11.6 *	0.2	22.9
No Pre-Intervention Medicaid Record	-27.33 ***	-39.95	-14.71	-15,063 ***	-21,916	-8,210
Medicaid Days (pre-intervention)	0.84 ***	0.69	1.00	-10.4	-95.0	74.2
Medicaid Stays (pre-intervention)	-1.95	-5.74	1.85	-999.6	-3,213.5	1,214.3
Amount Billed to Medicaid (pre-int.)	0.00	0.00	0.00	0.8 ***	0.7	1.0
Shelter Days (pre-intervention)	0.01	-0.01	0.02	3.0	-6.3	12.2
Age	-0.01	-0.43	0.41	27.6	-188.9	244.1
Male	-4.50	-11.44	2.44	-1,543	-5,400	2,314
Black Race	-8.28 *	-15.30	-1.26	-4,853 *	-8,680	-1,026
295 Diagnosis (schizophrenia)	-21.60 ***	-29.24	-13.96	-7,947 ***	-12,177	-3,717
296 Diagnosis (affective disorder)	-21.07 ***	-29.24	-12.91	-11,524 ***	-16,152	-6,895
Chemical Dependency Diagnosis	-13.74 ***	-20.15	-7.33	-9,979 ***	-13,402	-6,556

Note: In records where there is no pre-intervention period Medicaid inpatient stay, the value 731 days is inserted.

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

Outpatient Services. In contrast to the reductions in inpatient services that have been documented so far, table 9 shows an *increase* in the amount of outpatient visits and costs, by 95.2 percent and 114.1 percent, respectively, for the 1995 NY/NY cohort. Looking at the case-control group, the same group as was used for the inpatient analysis, the significant and substantial increase among the cases is matched by a modest, nonsignificant pre-post increase in the number of outpatient visits by the control group. These pre-post changes in visits consumed and costs accrued, when adjusted through a multivariate model (table 10), yield an increase of 68.9 visits (95 percent c.i. of 47.1 to 90.6) and \$5,612 (95 percent c.i. of \$3,871 to \$7,352) associated with NY/NY placement. Averaging this over all 733 NY/NY placements in 1995 results in increases of 47.2 visits (95 percent c.i. of 32.3 to 62.1 visits) and \$3,843 (95 percent c.i. of \$2,651 to \$5,035).¹⁵ These adjusted amounts reflect proportional increases of 75.9 percent and 81.5 percent over the mean number pre-intervention outpatient visits consumed and costs accrued, respectively.

¹⁵ Estimated using the same procedure as detailed in footnote 14.

Table 9. Outpatient Visits Reimbursed by Medicaid for People in NY/NY Housing and Controls in Two-Year Periods Before and After NY/NY Intervention

	NY/NY (total 1995)	NY/NY (matched pair)	Controls (matched pair)
N	733	457	457
Medicaid Service Users	502	457	457
<u>Pre NY/NY Intervention (2 years)</u>			
Total People w/ Outpatient Visits	461 (62.9%)	419 (91.7%)	410 (89.7%)
Total Outpatient Visits	45,615	42,623	37,323
Mean Visits (all people)	62.2	93.3	81.7
Mean Visits (hospital users)	98.9	101.7	91.0
Total \$\$ Billed to Medicaid	\$ 3,448,239	\$ 3,246,487	\$ 2,796,755
Mean \$\$ Billed (all people)	\$4,704	\$7,104	\$6,120
Mean \$\$ Billed (hospital users)	\$7,480	\$7,748	\$6,821
<u>Post NY/NY Intervention (2 years)</u>			
Total People w/ Outpatient Visits	483 (65.9%)	440 (96.3%)	374 (81.8%)
Total Outpatient Visits	89,042	80,913	40,109
Mean Visits (all people)	121.5	177.1	87.8
Mean Visits (hospital users)	184.4	183.9	107.2
Total \$\$ Billed to Medicaid	\$ 7,382,207	\$ 6,587,614	\$ 3,218,494
Mean \$\$ Billed (all people)	\$10,071	\$14,415	\$7,043
Mean \$\$ Billed (hospital users)	\$16,013	\$14,972	\$8,606

Notes:

For number of outpatient visits (non-HHC) reimbursed by Medicaid: Between NY/NY and control groups, paired comparison t-test yield, in assessing pre-intervention difference, $t = 1.5$ (456 degrees of freedom and $p = .15$) and, for post-intervention difference, $t = 7.7$ (456 degrees of freedom and $p < .0001$). Pre-post differences yield, within the NY/NY group, $t = -8.2$ (456 degrees of freedom and $p < .0001$) and, within the control group, $t = -0.9$ (456 degrees of freedom and $p = .35$), again using paired comparison t-tests.

For billing of outpatient visits (non-HHC) reimbursed by Medicaid: Between NY/NY and control groups, paired comparison t-tests yield, in assessing pre-intervention differences, $t = 1.4$ (456 degrees of freedom and $p = .15$) and, for post-intervention differences, $t = 7.6$ (456 degrees of freedom and $p < .0001$). Pre-post differences yield, within the NY/NY group, $t = -9.2$ (456 degrees of freedom and $p < .0001$) and, within the control group, $t = -1.7$ (456 degrees of freedom and $p = .10$), again using paired comparison t-tests.

Table 10. Regression Model Estimating Effects on Changes in Visits and Costs related to Medicaid Outpatient Use in the Two-Year Periods Preceding and Following the NY/NY Placement (N=457 matched pairs)

Covariate	Visits Reduction			Cost Reduction (in \$)		
	Parameter Estimate	95% Conf. Int. Lower Upper		Parameter Estimate	95% Conf. Int. Lower Upper	
Intercept	-0.97	-66.20	64.25	-4,130	-9,394	1,134
Received NY/NY Placement	-68.88 ***	-90.62	-47.14	-5,612 ***	-7,352	-3,871
Gap – Visit to NY/NY Intervention	0.11 **	0.04	0.18	10.02 ***	5.00	15.04
No Pre-Intervention Medicaid Record	-64.36 **	-110.25	-18.47	-5,427 **	-8,808	-2,047
Medicaid Visits (pre-intervention)	0.53 ***	0.26	0.81	-3.69	-26.99	19.61
Amount Billed to Medicaid (pre-plc.)	0.00	0.00	0.00	0.58 ***	0.30	0.87
Shelter Days (pre-intervention)	-0.05	-0.14	0.05	-2.90	-9.33	3.53
Age	-1.24	-2.67	0.19	-10.99	-118.89	96.92
Male	32.64 *	6.86	58.42	2,637 *	525	4,749
Black Race	0.79	-22.25	23.82	545	-1,296	2,385
295 Diagnosis (schizophrenia)	-25.96	-52.75	0.82	-2,820 **	-4,867	-774
296 Diagnosis (affective disorder)	-38.09 **	-66.53	-9.64	-2,641 *	-4,725	-557
Chemical Dependency Diagnosis	6.83	-22.38	36.04	1,009	-1,306	3,324

Note: In records where there is no pre-intervention period Medicaid inpatient stay, the value 730 days is inserted.

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

Use of VA Hospitals

This analysis examines inpatient VA hospital data from 1992 through 1999 across pre- and post-intervention periods for the 2,496 people with NY/NY placements in the years 1994 to 1997 and, when applicable, the controls that are matched to individual observations.¹⁶ Among the NY/NY placements, 323 (12.9 percent) had some record of VA inpatient hospitalization between 1992 and 1999. Of these, 255 (10.2 percent) had records of hospitalization, and these observations, whether or not they had shelter records, were matched with people who had DHS shelter records (but not necessarily in the two-year pre-intervention period). Of the 323 observations with VA records, 294 (91 percent) were matched with control observations. Table 11 shows that both NY/NY and control groups had (by design) virtually identical numbers of days of pre-intervention VA inpatient hospital use, and that this use declined significantly for both cases and controls in the post-intervention period. However, the decline was substantially greater among the cases than the controls, leading to statistically significant post-intervention case-control differences (p<.001).

¹⁶ Judging from the information available, approximately 20 percent of the people receiving NY/NY placement claim veteran status. These proportions are somewhat higher for males (27 percent) and very small for females (2 percent). This suggests that approximately one-fifth of the people with NY/NY placements are eligible for VA services, and that a likely smaller number will actually make use of these services. The DRGs for hospitalizations for people with NY/NY placements show that over 75 percent of the stays involved treatment for mental illness and/or substance abuse (Metraux et al. 2000).

Table 11. VA Inpatient Days Consumed by People in NY/NY Housing and Controls in Two-Year Periods Before and After NY/NY Intervention

	NY/NY-DHS (total 1994-97)	NY/NY (matched pair)	Controls (matched pair)
N	2,496	294	294
Total Service Users	323	294	294
People w/ Pre-Intervention VA Hospitalization	255 (10.2%)	229 (77.9%)	229 (77.9%)
Total Pre-Intervention Hospital Days	19,578	15,332	15,130
Mean Pre-Intervention Hospital Days (all people)	7.8	52.1	51.5
Mean Pre-Intervention Hospital Days (hospital users)	76.8	67.0	66.1
People w/ Post-Intervention Hospitalization	169 (6.8%)	153 (52.0%)	180 (61.2%)
Total Post-Intervention Hospital Days	8,053	7,651	12,289
Mean Post-Intervention Hospital Days (total)	3.2	26.0	41.8
Mean Post-Intervention Hospital Days (hospital users)	47.7	50.0	68.3

Notes: Between NY/NY and control groups, paired comparison t-test assessing difference yield, for pre-intervention state hospital days, $t = -0.8$ (293 degrees of freedom and $p = .41$), and, for post-intervention differences, $t = 3.7$ (293 degrees of freedom and $p < .001$). Pre-post differences yield, within the NY/NY group, $t = 6.9$ (293 degrees of freedom and $p < .0001$) and, within the control group, $t = 2.3$ (293 degrees of freedom and $p < .05$), again using paired comparison t-tests.

The regression model results on table 12 show a significant 14.4-day reduction in VA hospital use (95 percent c.i. of 5.6 to 23.1 days), all other factors held equal. When averaged over all 2,496 NY/NY placements made during the years 1994 to 1997, this effect becomes considerably more diluted, resulting in an estimate of 1.9 days saved (95 percent c.i. of 0.7 to 3.0 days) per NY/NY placement. This represents an adjusted 24.4 percent decrease in mean pre-intervention VA hospital days used attributable to the effect of a NY/NY placement.¹⁷

¹⁷ Estimated by multiplying 14.4 by the 323 people with NY/NY placements and Medicaid inpatient (non HHC) records (from which the control group was selected) and then dividing by the 2,496 people with NY/NY placements and Medicaid inpatient records.

Table 12. Regression Model Estimating Effects on Changes in VA Hospital Days Used In the Two-Year Periods Preceding and Following the NY/NY Intervention (N=294 matched pairs)

Covariate	Parameter Estimate (Days Saved)	Lower (95%) c.i.	Upper (95%) c.i.
Intercept	34.63 *	0.54	68.72
Received NY/NY Placement	14.37 **	5.60	23.14
Gap – VA to Intervention	0.03	0.00	0.06
Pre NY/NY Shelter Record	-18.31	-37.40	0.78
VA Days (Pre-Intervention)	0.77 ***	0.62	0.91
VA Stays (Pre-Intervention)	0.02	-4.89	4.93
Pre NY/NY Shelter Days	0.01	-0.01	0.04
Placement in 1994	reference category		
Placement in 1995	-1.45	-12.47	9.57
Placement in 1996	9.73	-0.67	20.12
Placement in 1997	9.26	-3.15	21.68
Age	-0.62 *	-1.11	-0.13
Male	-19.15 *	-34.97	-3.34
Black Race	-4.14	-12.60	4.31
295 Diagnosis (Schizophrenia)	-15.40 **	-25.96	-4.84
296 Diagnosis (Affective Disorders)	-26.78 ***	-37.45	-16.12
Chemical Dependency Diagnosis	-10.93 *	-19.43	-2.44

Note: For those with no pre-intervention VA inpatient record, “gap” is set at 731 days.

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

Incarceration in NYSDOCS Prisons

The last type of institution included in this study involves incarceration facilities: state prisons and city jails. For state prisons, data include incarcerations up to April 15, 1997; thus, all NY/NY placements made before April 15 1995 are included in this analysis. Due to records availability, the case-control group that was used in the DHS shelter analysis is again used here to assess differences in pre and post-intervention days spent incarcerated in NYS prisons. Because of this, the case group only includes those people with DHS shelter records, and 44 pairs were omitted from the analysis because the control observation was incarcerated at the intervention point and thus would have biased the pre-post analyses.¹⁸

Table 13 shows that low proportions of observations in either group have records of incarceration. Despite this, the NY/NY placements show substantial reductions in use of state prisons. In the case-control comparison, the state prison utilization for the two groups is very similar (and statistically nonsignificant) in the pre-intervention period, suggesting that, for the purposes of this analysis, the groups are comparable. In the post-intervention period, the NY/NY group shows a substantial, statistically significant reduction in the number of days incarcerated (p<.0001), while the control group fails to show any significant reduction in the number of people incarcerated or in the total number of days the group was incarcerated.

¹⁸ In these 44 pairs, the case observation did not necessarily have an incarceration record.

Table 13. NYSDOCS Prison Days Utilized by People in NY/NY Housing and Controls in Two-Year Periods Before and After NY/NY Intervention

	NY/NY-DHS (total up to 4/1/95)	NY/NY (matched pair)	Controls (matched pair)
N	3,196	2,285	2,285
Total Service Users	109	94	136
<u>Pre-NY/NY Intervention Period</u>			
People Incarcerated	87 (2.7%)	75 (3.3%)	74 (3.2%)
Time Incarcerated (days)	29,569	25,490	25,241
Time Incarcerated (days per total people)	9.3	11.2	11.0
Time Incarcerated (days per person incarcerated)	339.9	339.9	341.1
<u>Post-NY/NY Intervention Period</u>			
People Incarcerated	36 (1.1%)	32 (1.4%)	78 (3.4%)
Time Incarcerated (days)	7,818	6,938	26,236
Time Incarcerated (days per total people)	2.4	3.0	11.5
Time Incarcerated (days per person incarcerated)	217.1	216.8	336.4

Notes: Between NY/NY and control groups, paired comparison t-test assessing difference in pre-intervention state incarceration days yields $t = -.05$ (2,294 degrees of freedom and $p = .96$). For post-intervention differences, $t = 5.2$ (2,294 degrees of freedom and $p < .0001$). Pre-post differences within the NY/NY group yields $t = 5.2$ (2,294 degrees of freedom and $p < .0001$) and within the control group yields $t = -0.2$ (2,294 degrees of freedom and $p = .83$), using paired comparison t-tests.

After controlling for various factors using multiple regression, as shown in table 14, having a NY/NY placement is associated with a reduction of 7.9 days (95 percent c.i. of 4.8 to 11.0 days). This estimate differs from those in the previous models in that placements in the case and control group were included regardless of whether or not they had a state prison record. As case-control data are unavailable for the incarceration of people without a DHS shelter record, this adjusted reduction is used, without further adjustment, as the per-placement reduction in prison use attributable to NY/NY. Taking this reduction estimate as a proportion of average pre-intervention prison use, 7.9 days represents a 84.8 percent reduction in the mean pre-intervention days spent incarcerated by the NY/NY group.

Table 14. Regression Model Estimating Effects on Changes in NYSDOCS Incarceration Days in the Two-Year Periods Preceding and Following the NY/NY Intervention (N=2,285)

Covariate	Parameter Estimate (Days Saved)	Lower (95%) c.i.	Upper (95%) c.i.
Intercept	-24.56 ***	-33.75	-15.36
Received NY/NY Placement	7.89 ***	4.81	10.97
Any Incarceration (pre-intervention)	-48.98 **	-84.54	-13.41
Days Incarcerated (pre-intervention)	1.04 ***	0.95	1.12
DHS Days (pre-intervention)	0.01 **	0.00	0.01
Age at NY/NY Intervention	0.35 ***	0.21	0.50
Male	-3.68 **	-6.46	-0.89
Black	1.88	-1.39	5.15
Mental Illness Indicator	2.43	-0.80	5.66
Drug/Alcohol Dependency Indicator	0.47	-2.81	3.75
NY/NY Placement in 1990	(reference category)		
NY/NY Placement in 1991	-3.35	-9.96	3.25
NY/NY Placement in 1992	-0.80	-6.24	4.64
NY/NY Placement in 1993	-0.71	-5.83	4.41
NY/NY Placement in/after 1994	-0.31	-5.01	4.40

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

Incarceration in NYCDOC Jails

Analysis of incarceration data from NYCDOC augments the NYSDOCS analysis, which does not cover any incarceration episodes in county or municipal corrections facilities. This analysis of NYCDOC incarceration records for Riker's Island and other local jail facilities follows the same case-control group that is followed in the NYSDOCS and DHS analyses.¹⁹

As shown in table 15, the number of people incarcerated as well as the time spent in jail declined significantly for the NY/NY group from the pre-intervention to post-intervention periods. People spending time in jail represented 12.0 percent of the total NY/NY group in the pre-intervention period, but only 8.2 percent of this group in the post-intervention period. The total number of days incarcerated fell 39.8 percent after the housing placements. The average number of people and days incarcerated fell such that not only did fewer people get jailed after their housing placements, but, for those incarcerated, the average time spent behind bars also fell.²⁰ These pre-post dynamics are not replicated in the control group. While the NY/NY and control groups are comparable in their pre-intervention period use of jails, the magnitude of the reduction per

¹⁹ The data set used here is larger than the one in the NYSDOCS analysis due to data being available through 1999 for this analysis (see appendix A). There are no duplicate incarceration records between this and the NYSDOCS analyses, although some of the incarceration records examined here immediately precede state prison records used in the other analysis. Of the 1,590 offenses related to the study group over this time, by far the most frequently occurring types involved possession or sale of drugs (27.2 percent), offenses related to assault (12.8 percent), theft (11.6 percent), and larceny (8.9 percent). Thirty-nine percent of these offenses were charged as felonies (Metraux, Culhane, and Hadley 2001b).

²⁰ Fifty-four matched pairs were omitted because the control observation was incarcerated on the intervention date.

placement realized by the NY/NY group (4.4 days) is statistically significant ($p < .0001$), as opposed to the smaller and nonstatistically significant pre-post reduction for the control group (1.1 days).

Using multiple regression to control for other factors, as shown in table 16, NY/NY placement is with, all else held constant, a 3.8-day reduction per placement (95 percent c.i. of 1.8 to 5.8 days). As in the NYSDOCS analysis, the estimated regression model includes all of the DHS case-control observations, regardless of whether they have a record of jail use, and 3.8 days represents the number of days per placement (without further adjustment) that is attributed to a NY/NY placement. This represents a 38.0 percent decrease in the mean pre-intervention period number of incarceration days used by the case group.

Table 15. NYCDOC Jail Days Utilized by People in NY/NY Housing and Controls in Two-Year Periods Before and After NY/NY Intervention

	NY/NY-DHS (1989-1997)	NY/NY (matched pair)	Controls (matched pair)
N	4,679	3,284	3,284
Total Service Users	766	607	716
<u>Pre-NY/NY Intervention Period</u>			
People Jailed	563 (12.0%)	441 (13.4%)	480 (14.7%)
Time in Jail (days)	46,574	36,165	41,481
Time in Jail (days per total people)	10.0	11.0	12.6
Time in Jail (days per person jailed)	82.7	82.0	86.4
<u>Post-NY/NY Intervention Period</u>			
People Jailed	383 (8.2%)	308 (9.4%)	457 (13.9%)
Time in Jail (days)	28,027	21,711	37,828
Time in Jail (days per total people)	6.0	6.6	11.5
Time in Jail (days per person jailed)	73.2	70.4	82.8

Notes: Between NY/NY and control groups, paired comparison t-test assessing difference yield, for pre-intervention city jail incarceration days, $t = 1.4$ (3,283 degrees of freedom and $p = .17$) and, for post-intervention differences, $t = 4.8$ (3,283 degrees of freedom and $p < .0001$). Pre-post differences yield, within the NY/NY group, $t = 4.8$ (3,283 degrees of freedom and $p < .0001$) and, within the control group, $t = 1.1$ (3,283 degrees of freedom and $p = .29$), again using paired comparison t-tests.

Table 16. Regression Model Estimating Effects on Changes in NYC Jail Days in the Two-Year Periods Preceding and Following the NY/NY Intervention (N=3,284 matched pairs)

Covariate	Parameter Estimate (Days Saved)	Lower (95%) c.i.	Upper (95%) c.i.
Intercept	-18.21 ***	-24.17	-12.26
Received NY/NY Placement	3.81 ***	1.79	5.84
Any Jail (pre-intervention)	-22.32 ***	-28.61	-16.03
Days Jailed (pre-intervention)	0.93 ***	0.88	0.98
Any Shelter Use (pre-intervention)	1.80	-1.11	4.71
DHS Days (pre-intervention)	0.01 ***	0.00	0.01
Age at NY/NY Intervention	0.25 ***	0.17	0.33
Male	-4.41 ***	-6.48	-2.35
Black	-0.03	-2.09	2.04
Mental Illness Indicator	-1.64	-3.73	0.45
Drug/Alcohol Dependency Indicator	-0.33	-2.61	1.94
NY/NY Placement in 1991	(reference category)		
NY/NY Placement in 1991	3.05	-1.46	7.56
NY/NY Placement in 1992	4.61 *	0.28	8.94
NY/NY Placement in 1993	2.93	-1.60	7.46
NY/NY Placement in 1994	0.39	-4.12	4.91
NY/NY Placement in 1995	-0.12	-4.84	4.59
NY/NY Placement in 1996 or 1997	2.49	-1.89	6.87

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

Cumulative System Effects

The results of the system-specific analyses have thus far been presented separately by agency over the two-year post placement period. For purposes of facilitating interpretations of the cumulative effects of the intervention within and across systems, summary results are provided in tables 17 and 18.

Table 17. Summary of Mean Two-Year Pre-NY/NY Intervention Period Service Use Across Seven Service Providers

Service Provider	Mean Days Used – (2 Yrs Pre-NY/NY)	Per Diem (1999 \$)	Cost (2 Years)	Annualized Cost
Dept. of Homeless Services	137.0	\$68	\$9,316	\$4,658
Office of Mental Health	57.3	\$437	\$25,040	\$12,520
Health and Hosp. Corp.	16.5	\$755	\$12,458	\$6,229
Medicaid – Inpatient	35.3	\$657	\$23,192	\$11,596
Medicaid – Outpatient (stays)	62.2	\$84	\$5,225	\$2,612
Veterans Administration	7.8	\$467	\$3,643	\$1,821
Dept. of Corrections (State)	9.3	\$79	\$735	\$367
Dept. of Corrections (City)	10.0	\$129	\$1,290	\$645
Total			\$80,898	\$40,449

Table 18. Summary of Estimated Cost Reductions Associated with Reductions in Service Use Attributable to NY/NY Housing, by Type (1999 dollars)

Service Provider	Days Saved (2 Years Pre-Post)	Cost Reduction 95% c.i.	Per Diem (1999 \$)	Cost Reduction (2 Years)	Annualized Cost Reductions
Dept. of Homeless Services	82.9	77.4 – 88.5	\$68	\$5,637	\$2,819
Office of Mental Health	28.2	20.8 – 35.6	\$437	\$12,323	\$6,162
Health and Hosp. Corp.	3.5	2.0 – 5.0	\$755	\$2,643	\$1,321
Medicaid – Inpatient	8.6	4.2 – 13.0	\$657	\$5,650	\$2,825
Medicaid – Outpatient (visits)	-47.2	-62.1 – -32.3	\$84	-\$3,965	-\$1,982
Veterans Administration	1.9	0.7 – 3.0	\$467	\$887	\$444
Dept. of Corrections (State)	7.9	4.8 – 11.0	\$79	\$624	\$312
Dept. of Corrections (City)	3.8	1.8 – 5.8	\$129	\$490	\$245
Total				\$24,290	\$12,145

Table 17 estimates the *costs* of service utilization by the intervention group in the two years *prior* to their housing placement by multiplying service days used by the average per diem service cost (in 1999 dollars). These costs are then annualized by dividing by two. The results show that, per placement per year, the total mean cost of service utilization for the two-year pre-NY/NY placement period was \$40,449. The bulk of those expenditures occurred in health services (86 percent, or \$34,778), and in emergency shelter services (11 percent or \$4,658 dollars). Criminal justice services (incarceration costs only) accounted for only 3 percent or \$1,012 per year.

Table 18 summarizes estimates of the *cost reductions* in service utilization, based on pre-post placement comparisons, and as adjusted by the case-control regression analyses. Cost savings are again imputed based on estimated per diem costs by service system in 1999 dollars. Results indicate that placement in NY/NY housing is associated with a \$12,145 net reduction in health, corrections, and shelter service use annually per person, over each of the first two years of the intervention. Half of those cost reductions are associated with reduced utilization of state psychiatric inpatient services, and another quarter (23 percent) are associated with reduced utilization of emergency shelter services. Half of the remaining quarter in net savings are associated with reduced utilization of NYC public hospitals (10.9 percent of total), and VA hospitals (3.7 percent). Reductions in costs associated with Medicaid inpatient services outweigh, by \$843 (6.9 percent of total cost reductions), the increases in Medicaid outpatient services. Taken together, about 95 percent of the cost reductions are associated with reductions in health and shelter services. Criminal justice system costs account for the remaining 4.5 percent of the total cost reductions associated with a supportive housing placement.

Do Reductions in Service Utilization Offset the Costs of Supportive Housing?

One of the primary purposes of the previous analyses was to determine whether reductions in service utilization attributable to a housing placement offset the costs of the housing intervention. To compare the costs of the intervention with the reduced service system costs, both sets of costs have to be computed in comparable terms. In the previous cross-system analysis, the service

utilization reductions were calculated in terms of annualized average cost reductions *per placement* in the two-year period after housing placement. Alternatively, housing cost figures, given the annual budgeting process by which they are calculated by city and state officials (the methodology for deriving the housing costs is provided in appendix B), are measured in annual costs *per housing unit*. Each measure has its usefulness, the former for service system planners who need to project costs for a pool of placements, taking account of client turnover, and the former for housing planners, who need to project costs based on fully occupied units of housing, irrespective of turnover.²¹

Per Placement Per Year

Table 19 shows the conversion of annual costs per housing unit into annualized costs per placement, both overall and as broken down by the two housing models featured in NY/NY.²² The *annualized cost per placement*, averaged over the two-year post-placement period and derived by multiplying the annual costs per housing unit by the average annual length of tenure (0.746 years), is \$13,570. This can then be compared with the adjusted service cost reductions reported in the last column of table 18, which shows an annualized reduction of \$12,145 per placement. The result is a net annual cost of \$1,425 associated with a NY/NY placement. It is noteworthy that the Supportive Housing units, which comprise two-thirds of the units developed, have an annualized cost per placement of \$12,889, and therefore operated at a lower average annualized net cost of \$744 per placement.

Table 19. Estimated Annual Costs Per Unit and Annualized Costs Per Placement of NY/NY Housing, by Housing Type (1999 dollars)

Housing Type	Number of Units	Annualized Per Unit Cost	Annualized Per Placement Cost
Community Residence (mean)	1,384	\$19,662	\$14,668
Supportive Housing (mean)	2,231	\$17,277	\$12,889
Weighted mean	3,615	\$18,190	\$13,570

²¹ Because these measures are not directly comparable, they must be converted, taking into account client turnover, to produce annualized cost and cost reduction estimates. Because tenant-level data on length of housing tenure for each placement were not available for this analysis, aggregated data on longevity of placement in NY/NY housing, presented in Lipton (1996), are used. These data indicate that NY/NY tenants stay in housing, on average, for 17.9 months of the two-year post-intervention period. The annualized length of tenure is therefore 8.95 months, or 0.746 of a year. The inverse of this number, 1.34, produces the annualized average number of tenants per housing unit. These numbers are used to compute both “annualized per placement” costs from the annual housing unit costs in appendix B and “annualized per housing unit” service cost reductions from the per placement service use reductions in table 18. These two computations reflect inverse procedures, and are equally valid approaches for comparing the service cost savings and the housing costs associated with the intervention (all figures are in 1999 dollars).

²² See appendix B for the specific housing programs; see especially table B.8. in appendix B.

Per Housing Unit Per Year

Alternatively (and inversely), one can convert the annualized service utilization reductions, reported in terms of *placements* (table 18) into *annualized reductions per housing unit* (table 20). These reductions are then expressed in terms of average annualized service cost reductions per housing unit by multiplying the annualized per placement service reductions by the annualized number of tenants per housing unit (1.34 per year).²³ This procedure yields turnover-adjusted cost reductions per housing unit per year of \$16,282, imputing an assumption of *year-round* housing occupancy. This figure can be compared with the estimated cost per housing unit per year, as shown in table 19 (and as computed in appendix B), which also assumes year-round occupancy of the housing. Comparing the average annual cost of a housing unit (\$18,190) with the comparable measure for the service utilization reductions, yields a net cost of \$1,908 per unit per year. Again, the Supportive Housing units, which comprise two-thirds of the units developed, operate at a lower net cost of \$995 per housing unit per year. The net cost attributable to year-round occupancy of NY/NY housing can be calculated by multiplying the annualized per unit net cost by 3,615 (the total number of housing units developed), yielding a net annual cost of \$6,897,420 per year.

Table 20. Annualized Cost Reductions Per Placement and Per Housing Unit, and Total NY/NY Housing Units (N=3,615), by Service Type

Service Provider	Annualized Cost Reductions Per Placement	Annualized Cost Reductions per Housing Unit	Total Cost Reduction by NY/NY Units (3,615)
Dept. of Homeless Services	\$2,819	\$3,779	\$13,660,436
Office of Mental Health	\$6,162	\$8,260	\$29,860,094
Health and Hospital Corp.	\$1,321	\$1,771	\$6,401,361
Medicaid – Inpatient	\$2,825	\$3,787	\$13,689,511
Medicaid – Outpatient (stays)	-\$1,982	-\$2,657	-\$9,604,464
Veterans Administration	\$444	\$595	\$2,151,555
Dept. of Corrections (state)	\$312	\$418	\$1,511,903
Dept. of Corrections (city)	\$245	\$328	\$1,187,232
Total	\$12,145	\$16,282	\$58,857,627

Finally, multiplying the turnover-adjusted cost reductions by 3,615 for each category of service produces an estimate of the annual cost reductions (or increases) accruing to each service type attributable to a year-round housing placement, as shown in the last column of table 20. These figures provide useful information about the impact of the intervention on aggregate service utilization annually by service type, and demonstrate that annual service use was reduced by \$58.9 million. This compares with the annual cost of the NY/NY intervention (including operating, service and debt service costs) of approximately \$65.8 million.

²³ 1.34 annualized tenants per year represents the inverse of the averaged annualized length of tenure, 0.746 years.

Discussion

The placement of homeless people with severe mental illness in supportive housing is, as expected, associated with substantial reductions in homelessness. Not only do homeless people with severe mental disabilities placed in housing have marked reductions in shelter use, they experience marked reductions in their use of hospital and correctional facilities as well. While other studies tracking the placement of homeless people in housing have found comparable housing retention rates, only a few, more limited analyses have assessed collateral service reductions (Proscio 2000; Averyt and Kamis-Gould 2000). In contrast, this study provides a uniquely broad and more comprehensive test, employing a case-control study design, and examining the impact of a comparatively large number of housing placements on seven major publicly financed service systems.

Importantly, this study was able to quantify for the first time in the published literature the extent of service use by homeless people with severe mental illness *prior* to a housing placement. Results show that such people are extensive users of publicly funded services, particularly inpatient health services, accumulating an average of \$40,449 per year in health, corrections and shelter system costs. While the costs of services before housing placement are comparably high for the cases and controls, due to the matching criteria of this study, it is not clear whether these costs can be generalized to all homeless people with SMI, and they certainly cannot be generalized to homeless people irrespective of mental health status. Nevertheless, in light of this high cost for such a significant number of people, the importance of the effect found in this study—that the supportive housing intervention significantly reduces these costs—is further reinforced.

Based strictly on the direct cost reductions measured here, and compared with the annual cost of the housing, the NY/NY initiative was a sound investment of public resources. The \$6.9 million net annual cost, or \$1,908 per housing unit per year, represents approximately 10 percent of the annual overall cost of providing this housing. However, the Supportive Housing units, which were the more common type of housing unit developed under this initiative, and which better represent the trend in housing development for people with mental illness, operated at a more modest per unit cost of \$995 per year, or 5 percent of the overall housing unit cost. In other words, 95 percent of the costs of the supportive housing (operating, service, and debt service costs) are compensated for by collateral service reductions attributable to the housing placement. This modest cost is particularly striking given the magnitude of the initiative, which required an original capital investment of \$200 million, and which costs \$64 million annually (inclusive of service, operating and debt service costs).

It should be noted that the service reductions measured in the study represent a conservative assessment of the impact of the initiative on service use and costs. First, by limiting the analysis to the impact on service use in the first two years post-intervention, the study has included the stabilization period associated with entry into housing. As in other service interventions for people with severe mental illness, service use often increases temporarily following placement, as tenants' unmet health and psychiatric needs are more likely to be identified and treated once they receive regular, periodic case management services (Pollio et al. 2000). If this were the case here, one would expect service use to decline and stabilize over time, producing net cost savings

in successive years. However, this possibility must be balanced with the possibility that people may be engaged in services more intensively prior to a housing placement, in part to ready them for such a placement. This area deserves further study.

This study did not include all direct or indirect costs associated with service use by the homeless people eventually placed in housing. Street outreach services, soup kitchens, and services provided by drop-in centers were not included. Health services funded by the federal Health Care for the Homeless program were not included. Other clinical and social services provided at shelters that are grant-funded by the U.S. Department of Housing and Urban Development's (HUD's) McKinney Act programs were also not included. The costs of uncompensated care provided by private hospitals were also not included, nor are the social costs of homelessness, which are far more difficult to enumerate or to associate with individual people. They include the costs of crime to crime victims, to the courts and the police, and the private and public costs of accommodating homelessness (or not) in public spaces.

Finally, many of the potential benefits of the housing initiative were also not measured. Residents of supported housing are more likely to secure voluntary or paid employment (HUD 1994) and to experience an improved quality of life. Investments in supported housing have also been shown to be associated with improved neighborhood quality and property values (Arthur Andersen, LLP et al. 2000). Last, the social value of reduced homelessness, and of providing greater social protection for the disabled, while not possible to translate into economic terms, constitutes an important if less tangible benefit to society. Taken together, these unmeasured costs of homelessness and benefits of the housing intervention would have increased its already significant net benefit (and potential cost savings) were all such costs and benefits included in this study.

Although this study was limited to one locality, and cannot be generalized to all urban areas, the results have important public policy implications. Research suggests that as many as 110,000 single adults with SMI are homeless on a given day in the United States, and as many as 260,000 single adults are chronically homeless.²⁴ If such people, or even significant proportions of them, are extensive users of acute care health services, public shelters, and criminal justice systems, then the results of this study suggest that an aggressive investment in supportive housing is warranted. While such housing may not be appropriate or effective for every person who is homeless and mentally ill, sufficient proportions would likely benefit such that their placement in housing could significantly offset the costs of a targeted initiative, such as was demonstrated in this report. In effect, the results presented here indicate that policy makers could substantially reduce homelessness for a large and visible segment of the homeless population—often thought

²⁴ Burt et al.'s (1999) analysis of a 1996 federal survey of homeless people suggests that as many as 840,000 people were homeless at one point in time in the United States that year. One-third of those were people in families, leaving approximately 546,000 single adults. A meta-analysis of epidemiological research estimates that approximately 20 percent of homeless adults without children have a severe mental illness (Lehman and Cordray 1993), yielding an estimated 109,200 people with SMI as homeless for that study period. Longitudinal research in two large U.S. cities (Philadelphia and New York) finds that people who are chronic shelter users, with or without a mental disability, represent approximately 50 percent of the daily shelter using population (Kuhn and Culhane 1998), or an estimated 273,000 of the adults during Burt's one-day study period. Given the differing sampling frames underlying their derivation, these figures must be understood as gross estimates only.

to be stubbornly beyond the reach of the social welfare safety net—at a very modest cost to the public.

However, while service use reductions may nearly cover the costs of supportive housing intervention in the aggregate (assuming the results here can be generalized beyond New York City), it remains a major public policy challenge to shift funds from one set of purposes (health, jails, prisons) to another (housing or housing support services). Different levels of government pay for different activities, and some will have to do so regardless of whether or not homeless people are using them (jails and prisons, for example). Moreover, legislative committees with responsibility for housing cannot appropriate funds from health committees for housing or housing support purposes, regardless of the savings in health costs that might justify the expenditure of funds. So, the challenge facing proponents of a national strategy to increase the supply of supportive housing will be to determine how costs can be paid in one area (for housing or housing support services), when the bulk of the savings from the intervention will accrue elsewhere (state mental health services, Medicaid, etc.). In New York, a complex packaging of federal, state and city resources was required to pay for the operating, service and debt service costs of the NY/NY initiative (see appendix B). Similarly, a national strategy will require the participation of various levels of government, and multiple agencies within each level of government.

Operating Costs

A substantial hurdle that must be overcome in developing and sustaining permanent supportive housing is bridging the gap between the costs of operating the housing and the extremely low incomes of prospective tenants. Supportive housing providers typically address this gap through a direct housing subsidy to the tenant or housing unit, and/or income supports to the tenants. The NY/NY initiative drew upon both strategies to cover the operating costs, relying on a combination of federal Section 8 subsidies, Supplemental Security Income payments by the state, and some direct state support, resulting in an average subsidy per unit of \$4,600 (see appendix B, derived from table 3).

Historically, HUD has been the primary source of housing subsidies. An especially potent source of operating subsidies for supportive housing serving homeless people, including those with SMI, has been the McKinney-Vento Homeless Assistance Act. This act has authorized operating subsidies in various forms under its three major programs: Section 8 MOD SRO Rehabilitation, the Supportive Housing Program, and Shelter Plus Care. Federal primacy and initiative in the provision of operating subsidies is likely necessary if supportive housing for homeless people with SMI is to be taken to scale. Even in relatively wealthy states, there is little evidence of an inclination to displace or even significantly add to the federal role in this regard (Twombly et al. 2001).

Although the federal investment in incremental housing subsidies slowed to a trickle in the mid-1990s (DeParle 1996), significant opportunities in this area may be on the horizon. In enacting HUD's fiscal year 2001 budget, Congress explicitly stated its goal that "HUD and local providers increase the supply of permanent supportive housing for chronically homeless,

chronically ill people over time until the need is met (estimated 150,000 units)” (U.S. House of Representatives 2000). To that end, Congress maintained its recent requirement that 30 percent of McKinney-Vento funds (about \$300 million per year based on recent annual appropriations) be targeted to permanent housing for homeless people with disabilities. If this funding level is maintained, this investment alone could result in the subsidy of 96,000 new units of supportive housing over the next ten years.²⁵

The fiscal year 2001 VA-HUD appropriations bill also authorized substantial changes in the statute, which allows local housing authorities to convert tenant-based Section 8 vouchers into project-based subsidies linked to specific units, in order to spur new development in tight housing markets or for special populations (U.S. Congress, 2000). The changes streamlined a previously underutilized tool for housing development,²⁶ and also increased the ceiling on such project basing of vouchers to 20 percent of the total tenant-based portfolio (the previous limit was 15 percent). Nationally, this could translate into more than 300,000 potential project-based operating subsidies.²⁷ Even in the absence of incremental vouchers, the new project-basing statutory authority can be of significant use in adding affordable units to serve special populations, such as homeless people with SMI, who often cannot access housing in a tight rental market even with a tenant-based subsidy (Sard 2001).²⁸

Thus, opportunities already exist to finance operating subsidies for permanent supportive housing. Of course, other issues remain to be resolved, including local resistance to the siting of such housing, the capacity of states and localities to develop this housing, and the ongoing financial burden of renewing operating subsidies (though this final factor obtains in respect to all federally subsidized affordable housing).

Capital and Debt Service

With respect to capital and debt service costs, the NY/NY initiative used a combination of city and state bonds, valued at nearly \$200 million, and, secondarily, federal tax credits, valued at

²⁵ This figure was derived from an estimated cost of \$6,100 per unit (based on HUD’s fiscal year 1999 estimates for the Shelter Plus Care program), assuming five-year terms, an inflation adjustment annually of 2 percent, yielding 9,643 subsidies per year. Over a decade, this would result in 96,433 incremental subsidies, assuming that any subsidies expiring during this period are renewed from another source.

²⁶ The New York City Housing Authority has been a notable exception among local housing agencies in its willingness in recent years to stimulate the development of new housing by project-basing a portion of its tenant-based Section 8 portfolio. Other housing authorities could be encouraged to follow its example under the new statutory provisions.

²⁷ While the Congress has appropriated between 50,000 and 100,000 incremental vouchers each year for the past half decade, the Bush budget proposes only 34,000 this year.

²⁸ Evidence suggests that homeless households, even without SMI, struggle to use housing subsidies in the private market. See *New York Times*, April 12, 2001 “Judge Orders City to Shelter 2 Suffering Homeless Families,” p. B2 (noting that city-funded rent subsidy program intended to house 460 homeless families had to date housed only 11 because private landlords were reluctant to accept them as tenants).

approximately \$5 million,²⁹ to fund the capital costs for acquisition, development, and rehabilitation. The average debt service cost per unit per year for the NY/NY initiative is approximately \$4,900 (see appendix B, table B.7.).

Several factors will affect whether sufficient capital investment/debt service can be obtained to develop supportive housing at scale to meet need among homeless person with SMI. Nationally, competition for federal tax credits with other low-income housing programs, and competition with other state and local purposes for bond funds, will pose a challenge to state and local leaders who must balance demands for housing for the homeless with other public interests. Whether the federal or state governments are willing to establish a priority for supportive housing for the homeless in this competitive process or will allocate new dollars, given the potential for offsetting cost savings, will have to be seen. The availability of capital/debt service funding is also likely to vary significantly across different regions of the country.

To the extent that existing affordable housing programs, including the Low-Income Housing Tax Credit and HOME programs, are perceived by policy makers to be insufficient alone to produce capital for housing affordable to extremely low income households (below 30 percent of area median income [AMI]), supportive housing providers would clearly benefit from a new production program targeted to that population.³⁰ In the 106th Congress, Senators from both major parties introduced bills directed to this purpose,³¹ and such a production program was nearly enacted as part of the fiscal year 2001 HUD appropriations bill. It remains to be seen whether such momentum will carry over into the 2001 congressional session or whether the new administration will identify such an initiative as a priority for HUD.

Supportive Services

The challenge of identifying funding for the *services* that must accompany this housing may well prove greater than that of finding the resources for the housing. In the case of the NY/NY initiative, the New York State Office of Mental Health paid for nearly all of the services associated with this housing, at an average cost of approximately \$9,100 per unit per year.³² As

²⁹ Approximately \$25 million in federal tax credit expenditures were involved in the NY/NY initiative, but only 20 percent of these funds supported capital costs; 80 percent was used to fund operating reserves (see appendix B).

³⁰ Data from the 1999 American Housing Survey reflects that there are more than 5 million fewer housing units affordable and available (i.e., not occupied by a household of higher income) to households below 30 percent of AMI than there are such households. Put another way, there are 7.7 million households below 30 percent of AMI, 4.9 million units affordable to a household at 30 percent of AMI—but 2.6 million of them are occupied by households above 30 percent of AMI—so only 2.3 million of the affordable units are actually available to them. (Dolbeare, Cushing, unpublished data; available from the authors.)

³¹ S.2997, National Affordable Housing Trust Fund Act of 2000 (introduced by Senator John Kerry, D-MA), available at www.thomas.loc.gov; S 3033, Housing Needs Act of 2000 (introduced by Senator Christopher Bond), also available at www.thomas.loc.gov.

³² For this calculation, tenant contributions, where applicable, were deducted from average state service contract amounts to produce a net service cost (see appendix B).

the results of this study show, the expenditures by the state OMH also provided ample returns, given that the plurality of cost reductions attributable to the intervention were reductions in OMH inpatient hospital costs (\$8,260 per housing unit, see table 20). Other inpatient health services paid by Medicaid, public hospitals, and the VA also experienced combined cost reductions (\$6,153 per housing unit per year, see table 20). However, only Medicaid paid for some of the housing support services (at a net savings of \$1,130 per housing unit per year).

From the perspective of developing a national strategy, the question for proponents will be how to motivate other states or health service payers (and potential savers) to make the commitment made by the New York State Office of Mental Health, and, secondarily, Medicaid, under this initiative. One possible mechanism is to make housing support services (or more of them) reimbursable by Medicaid. Unfortunately, some of these services, such as intensive case management or community treatment teams, are already Medicaid-reimbursable at the states' option, and many states do not avail themselves of this option. Another option is to increase funds and/or create a set-aside for housing support service funds in the federal Mental Health Block Grant. However, states have successfully opposed federal mandates on block grant funds, and may oppose such a mandate for this program. A third alternative would be to create a new program at the federal level, that would provide matching funds from the U.S. Department of Health and Human Service (HHS) for funds committed by HUD through its set-aside in the McKinney-Vento Act for permanent, supportive housing.³³ In this case, the services could be specifically targeted to housing for homeless people with mental disabilities.

Some interest in an invigorated federal role for HHS in this area has been suggested. For example, President Bush's proposed fiscal 2002 budget states "[I]n FY 2002, the Department will focus on providing permanent housing solutions to those without homes, and work closely with the Department of Health and Human Services to identify and remedy the barriers to homeless persons' access to mainstream supportive service programs."³⁴ Whatever the specific mechanism chosen, the provision of support services will be a necessary component to any national strategy to address the housing problems of homeless people with severe mental illness.

Conclusion

In sum, acquiring the resources for supportive housing will require local, state, and federal leadership in all three areas that comprise the essential elements of this intervention: operating subsidies, capital/debt service, and supportive services. The federal government, through new programs, matching funds, and set-asides within existing programs, can provide the incentives that engage states' interests. However, only executive leadership at the state level can compel various state agencies to work together for the common, multi-jurisdictional purpose of developing permanent supportive housing for homeless people with severe mental illness. This research has demonstrated the compensatory cost reductions of a supportive housing initiative

³³ Proposed HUD budget, pg. 25. (available at www.hud.gov).

³⁴ "106th Congress Wrap-up" (contains language of agreement reached in the appropriations process, but dropped at the later stages, available at <http://www.nlihc.org/106wrap/index.htm>).

once done, but only political will and leadership can act on such findings to guide the next initiative through the intergovernmental and interagency maze.

This study is qualified as being *post hoc* and quasi-experimental in nature. Therefore, the extent to which the cases and controls are truly comparable could not be addressed fully by random assignment. Comparability problems were reduced by matching cases and controls according to a variety of available demographic, service, and diagnostic criteria, and, further, by statistically correcting for differences that may have remained. However, the extent to which unmeasured differences may persist between the study groups cannot be fully ascertained. The possibility of a selection effect in the study sample cannot be eliminated. Whether housing providers select for heavier service users, or for less severe cases, could not be determined, though every effort was made to produce results generalizable to the population of homeless with SMI from which the intervention group was drawn. Despite this limitation, it is also clear that there does exist a relatively large pool of homeless people with SMI for whom this housing is effective in achieving housing stability and in providing offsetting reductions in collateral service use.

There are also caveats regarding the use of administrative data. Given the large volume of the data entered into the databases of the service systems studied here and a level of quality control for data entry that is not as stringent as is usual for scientific studies, administrative data can be prone to missing data, keystroke errors, and erroneous information otherwise being entered. While missing data did not present a problem in these analyses, it is more difficult to ascertain the data quality along the other dimensions. Despite these potential problems, administrative data is the only data source that can inform a study of service use covering a large study group over an extended period of time, as is done here.

Future research should specify the effects of the various housing types on service utilization patterns. Sources of attrition from supportive housing, and the housing transitions of people who exit supportive housing also deserve careful attention. For while most people remain stably housed two years after placement, the third of clients who exit this housing represent a substantial group whose further study is warranted. Future research could also benefit from replication of this study method, in that integrated administrative records provide a wealth of information on the utilization patterns and costs of a population which has otherwise proven costly and difficult to track and study. In particular, application of this method to the study of patterns of homelessness and service use among the majority of homeless who do *not* have a severe mental illness could likewise prove informative as to the potential efficacy of various policies and intervention strategies that would target them. Further fruitful areas of study could examine the same group studied here but follow their service use over longer pre- and post-intervention periods (as additional data becomes available), and/or through service systems not covered in this paper.

References

- Allison, P.D. 1999. *Logistic Regression Using the SAS System: Theory and Application*. Cary NC: The SAS Institute.
- Arthur Andersen LLP, University of Pennsylvania Center for Mental Health Policy and Services Research, K.E. Sherwood, and TWR Consulting. 2000. *The Connecticut Supportive Housing Demonstration Program Evaluation Report*. New Haven: Corporation for Supportive Housing.
- Averyt, J.M., and E. Kamis-Gould. 2000. The Effect of Supportive Housing on Tenants, Including Utilization and Costs of Services. Unpublished paper. Center for Mental Health Policy and Services Research, University of Pennsylvania.
- Bebout, R. R., and M. Harris. 1992. In Search of Pumpkin Shells: Residential Programming for the Homeless Mentally Ill. In *Treating the Homeless Mentally Ill: A Task Force Report of the American Psychiatric Association*, ed. H.R. Lamb, L.L. Bachrach, and F.I. Kass, 159–82. Washington, DC: American Psychiatric Association.
- Burt, Martha R., Laudan Y. Aron, Toby Douglas, Jesse Valente, Edgar Lee, and Britta Iwen. 1999. *Homelessness: Programs and the People They Serve*. Washington DC: The Urban Institute.
- Carling, Paul J. 1993. Housing and Supports for Persons with Mental Illness: Emerging Approaches to Research and Practice. *Hospital and Community Psychiatry* 44(5):439–49.
- Caton, C.L., R.J. Wyatt, A. Felix, J. Grunberg, and B. Dominguez. 1993. Follow-Up of Chronically Homeless Mentally Ill Men. *American Journal of Psychiatry* 150:1639–1642.
- Center for Mental Health Services. 1994. *Making a Difference: Interim Status Report of the McKinney Demonstration Program for Homeless Adults with Serious Mental Illness*. Washington DC: author.
- Center for Urban Community Services. 1995. *A Guide to Supportive Housing Models for People with Mental Illness and Other Special Needs*. New York: author.
- Culhane, Dennis P., and Stephen Metraux. 1997. Where to From Here: A Policy Research Agenda Based on the Analysis of Administrative Data. In *Understanding Homelessness: New Policy and Research Perspectives*, ed. Dennis P. Culhane and S.P. Hornburg. Washington DC: Fannie Mae Foundation.
- DeParle, Jason. 1996. The Year that Housing Died. *The New York Times Magazine*. October 20, p. 52.
- Dickey, B., O. Gonzalez, E. Latimer, K. Powers, R.K. Schutt, and S.M. Goldfinger. 1996. Use of Mental Health Services by Formerly Homeless Adults Residing in Group and Independent Housing. *Psychiatric Services* 47(2): 152-158.
- Drake, R.E., N.A. Yovetich, R.R. Bebout, M. Harris, and G.J. McHugo. 1997. Integrated Treatment for Dually Diagnosed Homeless Adults. *Journal of Nervous and Mental Disease* 185(5):298–305.
- Goldfinger, S.M., R.K. Schutt, G.S. Tolomiczenko, L.J. Seidman, W.E. Penk, W. Turner, and B. Caplan. 1999. Housing Placement and Subsequent Days Homeless among Formerly Homeless Adults with Mental Illness. *Psychiatric Services* 50:674–79.
- Hevesi, D. 1999. Building Homes for the Single Homeless. *New York Times*. April 28, Sec. 11, 1.

Hurlburt, M.S., P.A. Wood, and R. L. Hough. 1996. Providing Independent Housing for the Mentally Ill Homeless: A Novel Approach to Evaluating Long-Term Housing Patterns. *Journal of Community Psychology* 24:291–310.

Huffman, R.W. 1993. Transitional Housing for Veterans with a Psychiatric Diagnosis. *Journal of Nervous and Mental Disease* 178:415–22.

Kennedy, R. 1997. Doors that Offer Hope May Shut: A Program that has Housed the Mentally Ill Lapses. *New York Times*. October 4, p. B1.

Kennedy, S. G. 1995. New look for S.R.O.s: Decent Housing. *New York Times*. March 28, p. B1.

Kuhn, R. S., and Dennis P. Culhane. 1998. Applying Cluster Analysis to Test a Typology of Homelessness by Pattern of Shelter Utilization: Results from the Analysis of Administrative Data. *American Journal of Community Psychology* 26(2):207–32.

Lehman, A. F., and D. S. Cordray. 1993. Prevalence of Alcohol, Drug and Mental Disorders among the Homeless: One More Time. *Contemporary Drug Problems* 20:355–83.

Lewis, D. A., and A. J. Lurigio. 1994. *The State Mental Patient and Urban Life*. Springfield IL: Charles C. Thomas Publishing.

Lipton, F. R. 1996. Summary Client Placement Report of the New York-New York Agreement to House Homeless Mentally Ill Individuals. New York: New York City Human Resources Administration, Office of Health and Mental Health Services.

Lipton, F. R., S. Nutt, and A. Sabatini. 1988. Housing the Homeless Mentally Ill: A Longitudinal Approach of a Treatment Approach. *Hospital and Community Psychiatry* 39(1):40–45.

Lipton, F. R., C. Siegel, A. Hannigan, J. Samuels, and S. Baker. 2000. Tenure in Supportive Housing for Homeless Persons With Severe Mental Illness. *Psychiatric Services* 51(4):479–86.

Metraux Stephen, Dennis P. Culhane, and T. R. Hadley. 2001a. The Impact of NY/NY Supportive Housing Placements on Medicaid-Funded Health Care. Unpublished paper. Center for Mental Health Policy and Services Research, University of Pennsylvania.

Metraux Stephen, Dennis P. Culhane, and T.R. Hadley. 2001b. NY/NY Housing and The Use of New York City Jail Services: An Analysis Merging Administrative Data. Unpublished paper. Center for Mental Health Policy and Services Research, University of Pennsylvania.

Metraux Stephen, Dennis P. Culhane, and T. R. Hadley. 2000. Supportive Housing and Inpatient Hospital Use in the New York City Health and Hospitals Corporation Among Homeless Persons with Severe Mental Illness: Assessing the Impact of “New York/New York” on the Use of Public Hospitals. Unpublished paper. Center for Mental Health Policy and Services Research, University of Pennsylvania.

Metraux S., R. Rosenheck, Dennis P. Culhane, and T. R. Hadley. 2000. The Impact of NY/NY Supportive Housing Placements on Inpatient Use of Veteran’s Administration Hospitals. Unpublished paper. Center for Mental Health Policy and Services Research, University of Pennsylvania.

- Murray R., M. Baier, C. North, M. Lato, and C. Eskew. 1997. One-Year Status of Homeless Mentally Ill Clients Who Completed a Transitional Residential Program. *Community Mental Health Journal* 33(1):43–50.
- Pollio, D. E., E. L. Spitznagel, C. S. North, S. Thompson, and D. A. Foster. 2000. Service Use Over Time and Achievement of Stable Housing in a Mentally Ill Homeless Population. *Psychiatric Services* 51(12):1536–43.
- Proscio, T. 2000. *Supportive Housing and its Impact on the Public Health Crisis of Homelessness*. New York: Corporation for Supportive Housing.
- Ridgway, P., and C. A. Rapp. 1998. *The Active Ingredients of Effective Supported Housing: A Research Synthesis*. Lawrence, KS: University of Kansas School of Social Welfare.
- Rosenheck, R. 2000. Cost-Effectiveness of Services for Mentally Ill Homeless People: The Application of Research to Policy and Practice. *American Journal of Psychiatry* 157(10):1563–70.
- Salit, S. A., E. M. Kuhn, A. J. Hartz, J. M. Vu, and A. L. Mosso. 1998. Hospitalization Costs Associated with Homelessness in New York City. *New England Journal of Medicine* 338(24):1734–40.
- Sard, Barbara. 2001. *Revision of the Project-Based Voucher Statute*. Washington DC: Center on Budget and Policy Priorities (January 17).
- Shern, D. L., C. J. Felton, R. L. Hough, A. F. Lehman, S. M. Goldfinger, E. Valencia, D. Dennis, R. Straw and P. A. Wood. 1997. Housing Outcomes for Homeless Adults with Mental Illness: Results from the Second-Round McKinney Program. *Psychiatric Services* 48(2):239–41.
- Tsemberis, S. 1999. From Streets to Homes: An Innovative Approach to Supported Housing for Homeless Adults with Psychiatric Disabilities. *Journal of Community Psychology* 27(2):225–41.
- Tsemberis, S., and R. F. Eichenberg. 2000. Pathways to Housing: Supported Housing for Street-Dwelling Homeless Individuals with Psychiatric Disabilities. *Psychiatric Services* 51(4):487–93.
- Twombly, J., H. Lawson, C. H. Smith, and S. Crowley. 2001. *A Report on State-Funded Rental Assistance Programs: A Patchwork of Small Measures*. Washington: National Low Income Housing Coalition.
- U.S. Congress. 2000. PL 106-377, Section 232. 114 Stat. 1441A, at 31. “Depending on the size of the units subsidized and the extent to which the subsidies must cover debt service on capital.”
- U.S. Department of Housing and Urban Development. 1994. *National Evaluation of the Supportive Housing Demonstration Program*. Washington: HUD Office of Policy Development and Research.
- U.S. House of Representatives. 2000. Joint Explanatory Statement, Conference Report to HR 4635, PL 106-988. Washington: Author. “Depending on the size of the units subsidized and the extent to which the subsidies must cover debt service on capital.”

*Appendix A***Summary of Control Group Selection across Seven Public Services Systems***Table A.1. Selection Factors for Constructing the Matched-Pair Case-Control Groups Used in the Analyses*

Service Provider	Time Frame	Intervention Years Selected	Total NY/NY Placements	Matched Pairs	Restrictions
DHS	1987-1999	1989-1997	4,679	3,338	- NY/NY placements (cases) without a DHS shelter record are omitted (n=1,341)
OMH	1990-1996	1992-1994	2,396	570	NY/NY placements (cases) omitted include those: - without a state hospital (SH) inpatient record (n=1,499) - with SH record but without DHS shelter record (n=267) - without an appropriate control match (n=60)
HHC (non-Medicaid)	1989-1996	1991-1994	2,396	791	NY/NY placements (cases) omitted include those: - without DHS shelter record (n=412) - with DHS record but without HHC inpatient record (n=1,920) - without an appropriate control match (n=64)
Medicaid	1993-1997	1995	733	457	NY/NY placements (cases) omitted include those: - without a Medicaid claim record (n=231) - without an appropriate control match (n=45)
VA	1992-1999	1994-1997	2,496	294	NY/NY placements (cases) omitted include those: - without a VA hospital inpatient record (n=2,173) - without an appropriate control match (n=29)
NYSDOCS	1987-4/15/97	1989-4/15/95	3,196	2,285	NY/NY placements (cases) omitted include those: - without a DHS shelter record (n=911) - whose matched control observation was incarcerated on the placement date (n=44)
NYCDOC	1987-1999	1989-1997	4,679	3,284	NY/NY placements (cases) omitted include those: - without a DHS shelter record (n=1,341) - whose matched control observation was incarcerated on the placement date (n=54)

*Appendix B***Estimating Direct Federal, State and City Expenditures on the New York/New York Supportive Housing Initiative**

Stephen Metraux and Dennis P. Culhane

Introduction

In 1990, New York State (NYS) and New York City (NYC) agreed to collaborate on what became known as the "New York-New York" (NY/NY) supportive housing initiative. The agreement committed the state and city to jointly fund construction, operating and social service costs for 3,600 community-based housing units in New York City for people who were severely mentally ill and homeless.³⁵ While much of the funding for this program comes from the State and the City of New York, as well as from the federal government, the administration of these housing units is provided by an array of private non-profit organizations. This appendix provides estimates of the federal, state, and city outlays for the NY/NY initiative, in the aggregate, per year, per housing unit, and per housing placement. This compilation and disaggregation of costs is intended to provide a quantitative benchmark for evaluating returns from the program, as measured by collateral service utilization reductions in the accompanying analysis (Culhane, Metraux, and Hadley, 2001).

Data and Methods

Data used in this analysis on the distribution of housing units, and both the total and per unit operating, debt and service costs, were constructed from budget documents and in consultation with state and city administrators involved in the financing and administration of the New York/New York programs.³⁶ Inflation adjustments and unit-cost calculations were also verified by personal communication with program administrators. All figures are reported in 1999 dollars. Unless otherwise noted, all cost estimates assume full, year-round occupancy of the housing units. Actual costs will differ for specific sites and based on specific service contracts.

³⁵ This initiative is also now referred to as NY/NY I, as a second initiative to provide additional units under a similar State/City-financed structure ("NY/NY II") was passed in 1999.

³⁶ Final confirmation of data on the construction costs and debt service costs was obtained by personal communication with Michael Newman of the New York State Office of Mental Health (OMH) (March 5, 2001). Figures for the tenant contributions deducted from OMH-developed sites were confirmed in consultation with Chris Roblin of the New York State Office of Mental Health (April 4, 2001, personal communication). The value of federal Section 8 subsidies and the service cost estimates for the City-developed sites were confirmed by personal communication with Peter Bittle of the New York City Department of Mental Health (April 4, 2001). Information on the financing of City HPD-developed units was obtained by personal communication with Tim O'Hanlon (March 5, 2001) of the New York City Department of Housing Preservation and Development. Information on the City HRA-developed units was obtained from David Mittelman of the New York City Department of Homeless Services (March 25, 2001).

Housing and Service Configurations

The housing developed under the NY/NY initiative encompasses a variety of housing and service configurations, and consists of several distinct models that combine housing with rehabilitative or support services. The “residential continuum” includes, on the one end, “Supportive Housing” models that provide private, individual, apartment-style living accommodations with varied levels of service support. In the supportive housing model, the intensity of services provided is dependent on need as expressed by the tenant, and can change as the tenant's needs change. Tenants’ housing tenure is based on a lease arrangement, and is not contingent on a prescriptive service plan. On the other end of the continuum are “Community Residence” living arrangements that provide more intense and structured regimens of supportive services. Community residential programs are supervised, and receipt of housing is part of a structured treatment plan. Both Supportive Housing and Community Residence approaches are tied into bodies of research literature that provide theoretical rationales and evaluations for each respective approach. More relevant to the purposes of this inquiry, the two models of housing are associated with different funding sources and amounts.

Table B.1. shows the number of housing units, grouped by different housing and service configurations, funded under NY/NY. Under the housing subheading “Community Residences,” CR/SROs provide extended-stay housing in single-room occupancy (SRO) living units with on-site services for individuals who have minimal self-maintenance and socialization skills. CRs are single-site facilities with either private or shared bedrooms, meals provided, access to on-site rehabilitative services, and 24-hour staff coverage. CRs often target special populations, such as people with co-occurring mental health and substance abuse problems, and they seek to eventually place residents in less service-intensive, more permanent housing arrangements. The “Supportive Housing” grouping includes various state and city administered programs that range from scattered-site, individual apartments, to clustered apartments or SRO units in a single development. In both cases, services are available on a periodic or as-needed basis. For the “Capital (State)” supportive housing, construction was initiated by NY/NY funding, while “Rental (State)” supportive housing used existing units in the private rental market. For the City-funded supportive housing, the NYC-HPD housing units are administered through the City’s Department of Housing Preservation and Development, the NYC-HRA units are administered through the City’s Human Resources Administration, the NYC x NYS units are administered by the City with state capital funding, and the three NYC rental units use existing, private apartments that receive State funding for services.

Table B.1. NY/NY-funded Housing: Number of Units Under Different Housing/Service Configurations

Housing	Units
<u>Community Residences (CR)</u>	
CR/SROs	713
CRs	671
<u>Supportive Housing</u>	
Capital (State)	285
Rental (State)	520
Capital (NYC-HPD)	1,087
Capital (NYC-HRA)	258
Capital (NYC x NYS)	78
Rental (NYC)	3
Total Units	3,615

Operating and Service Costs

Different housing configurations, due to variations in housing layout and services offered, have varying levels of operating and service costs. Table B.2. shows the levels of service cost for the different types of housing. Service costs represent funding for social and related services provided to NY/NY tenants—services that are either provided on-site, brokered by case management staff, or arranged with outside providers. Depending on the unit type, federal, state, and city funding can pay for these services. The CR units have higher average service costs due to the higher intensity of services provided in them.³⁷ For the supportive housing subheading, however, while tenants receive less intense services than their counterparts in the CR housing, the differences in per unit funding reflect different funding levels and sources but not necessarily different intensities of service provision.

Table B.2. Service Costs for NY/NY Housing Type as Broken Down by Funding Source

Housing	Units	State Funding	City Funding	Per Unit Subtotal
<u>Community Residences</u>				
CR/SROs	713	\$10,500	\$0	\$10,500
CRs ³	671	\$15,865	\$0	\$15,865
<u>Supportive Housing</u>				
Capital (state)	285	\$8,400	\$0	\$8,400
Rental (state)	520	\$4,800	\$0	\$4,800
Capital (NYC-HPD)	1,087	\$9,400	\$900	\$10,300
Capital (NYC-HRA)	258	\$9,400	\$900	\$10,300
Capital (NYC-NYS)	78	\$9,400	\$900	\$10,300
Rental (NYC)	3	\$9,400	\$900	\$10,300

³⁷ Average service costs for CR units are \$19,200 per unit. However, because Medicaid pays for the services in 128 of these units, at an average annual cost of \$17,478 per unit, and because those costs are accounted for in the services utilization analysis as client outpatient costs paid by Medicaid (Culhane, Metraux, and Hadley 2001NOT IN REFS. Metraux, Culhane, and Hadley?? 2001a or b??), they have been removed here. This reduces the average service cost per CR unit to \$15,865, from *nonMedicaid* sources.

Operating costs, shown in table B.3., reflect costs needed for building upkeep, apartment maintenance, utilities, etc., and is most often provided in the form of rental subsidies to supplement the rent that the tenants pay. In federally subsidized units (Section 8), all of which are operated by the City of New York, tenants pay one-third of their income toward rent, here assumed to be the income for a person receiving Supplemental Security Income and “living alone” (\$617/month). One-third of this amount (\$185) has been deducted from the maximum fair market rent for an SRO allowed in New York City (\$500), and the difference calculated as the federal Section 8 contribution (\$3800).

Table B.3. Operating Costs for NY/NY Housing Type as Broken Down by Funding Source

Housing	Units	Federal (Sec. 8) Funding	State Funding	City Funding	Per Unit Subtotal
Community Residences					
CR/SROs	713	\$0	\$5,700	\$0	\$5,700
CRs	671	\$0	\$4,200	\$0	\$4,200
Supportive Housing					
Capital (state)	285	\$0	\$5,700	\$0	\$5,700
Rental (state)	520	\$0	\$5,000	\$0	\$5,000
Capital (NYC-HPD)	1,087	\$3,800	\$0	\$0	\$3,800
Capital (NYC-HRA)	258	\$3,800	\$0	\$0	\$3,800
Capital (NYC-NYS)	78	\$3,800	\$0	\$0	\$3,800
Rental (NYC)	3	\$3,800	\$0	\$0	\$3,800

Table B.4. combines the net unit operating and service costs, and, in applicable categories, deducts tenant contributions from this cost. In the case of many NYS OMH-administered units (all CR/SROs and capital-state), the Section 8 standard for tenant rent contribution (one-third of income) is applied. However, tenant rent contributions are deducted from state operating and service contracts after providers report tenant rent collections. Thus, a separate column in table B.4., “Less Tenant Contributions,” shows the impact of the deduction of tenant contributions from the operating and service cost contracts from these state-administered units (again, assuming full, year-round occupancy, by people receiving SSI income for an adult living alone). The deduction for CRs is higher (\$6,000 annually) because additional funds are deducted from tenant income to cover board costs in CRs. The Total Cost column reflects the per unit costs multiplied by the number of units for the particular type of housing in question, less tenant contributions, where applicable.

Table B.4. Combined Service and Operating Costs, Less Tenant Contributions, for NY/NY Housing

Housing	Units	Operating Per Unit Subtotal	Service Per Unit Subtotal	Less Tenant Contribution	Per Unit Cost	Total Cost
Community Residences						
CR/SROs	713	\$5,700	\$10,500	\$2,200	\$14,000	\$9,982,000
CRs	671	\$4,200	\$15,865	\$6,000	\$14,065	\$9,437,615
Supportive Housing						
Capital (state)	285	\$5,700	\$8,400	\$2,200	\$11,900	\$3,391,500
Rental (state)	520	\$5,000	\$4,800	\$0	\$9,800	\$5,096,000
Capital (NYC-HPD)	1,087	\$3,800	\$10,300	\$0	\$14,100	\$15,326,700
Capital (NYC-HRA)	258	\$3,800	\$10,300	\$0	\$14,100	\$3,637,800
Capital (NYC-NYS)	78	\$3,800	\$10,300	\$0	\$14,100	\$1,099,800
Rental (NYC)	3	\$3,800	\$10,300	\$0	\$14,100	\$42,300
Total	3,615					48,013,715

Capital Costs

Eleven percent of the NY/NY units utilize existing, private rental housing, and the rest of the units are located in buildings that have been specifically constructed or rehabilitated under the auspices of the NY/NY program. In the latter case, the capital was provided by the City or State of New York. Table B.5. shows the capital costs, both per unit and total, broken down by different subcategories of NY/NY housing. All of the capital costs per unit are budgeted at \$70,000, except for the HPD-administered supportive housing. The HPD units were \$50,000 per unit. Unit costs for HPD were lower for several reasons: HPD began its property acquisition process earlier than the State, when real estate values were relatively more depressed; HPD also acquired some properties at essentially no cost (properties it owned through tax foreclosure, from its stock of *in rem* buildings); and HPD's developments involved much larger buildings than the state's projects, so development costs per unit were lower (O'Hanlon, personal communication).³⁸

³⁸ Approximately half (N=508) of the HPD units received revenue from the sale of federal tax credits. For purposes of calculating the per-unit per year cost of the tax credits, the tax credits are assumed to pay out over a 15-year period, amounting to a \$3,333 per unit per year cost. Although the cost of the tax credits is not included in the tabulation of debt service costs here, given that only 20 percent of the tax credit revenue was used for capital support, it is figured into the final costs per unit by source, in table B.7., combined with the debt service amounts.

Table B.5. Capital Costs Allocated to Various Types of NY/NY-funded Housing

Housing	Units	Per Unit Costs			Combined Costs		
		State	City	Total	State	City	Total
Community Residence							
CR/SROs	713	\$70,000	\$0	\$70,000	\$49,910,000	\$0	\$49,910,000
CRs	671	\$70,000	\$0	\$70,000	\$46,970,000	\$0	\$46,970,000
Supportive Housing							
Capital (State)	285	\$70,000	\$0	\$70,000	\$19,950,000	\$0	\$19,950,000
Rental (State)	520	\$0	\$0	\$0	\$0	\$0	\$0
Capital (City x HPD)	1,087	\$0	\$50,000	\$50,000	\$0	\$54,350,000	\$54,350,000
Capital (City x HRA)	258	\$0	\$70,000	\$70,000	\$0	\$18,060,000	\$18,060,000
Capital (City x State)	78	\$70,000	\$0	\$70,000	\$5,460,000	\$0	\$5,460,000
Rental (City)	3	\$0	\$0	\$0	\$0	\$0	\$0
Total	3,615				\$122,290,000	\$72,410,000	\$194,700,000

New York City and State both financed capital costs through separate series of bond issues. Based on information available, on \$81 million of the \$130.5 million state capital costs, the aggregated interest rate on the state bond issues was 6.339 percent. Similarly, bonds issued by the city were charged interest rates of between 6 percent and 7 percent, with the higher rate being used for these calculations.³⁹ Using a 25-year amortization schedule and these interest rates, annual debt service costs are estimated in table B.6., and are allocated across the different types of housing, based on the number of housing units and the capital costs. Both the city and state incur these debt service costs on behalf of the housing provider as part of their assistance to NY/NY.

³⁹ Information on the state's NY/NY bond issues was provided through personal communication with Mike Newman at the New York State Office of Mental Health, information on the interest rates for New York City's bond issues was provided by the City of New York.

Table B.6. Estimated Debt Service on State and City Bond Issues to Fund Capital Costs for NY/NY Housing

Housing	Units	Per Unit Costs			Total Costs		
		State	City	Total	State	City	Total
Community Residence							
CR/SROs	713	\$5,630	\$0	\$5,630	\$4,013,976	\$0	\$4,013,976
CRs	671	\$5,630	\$0	\$5,630	\$3,777,730	\$0	\$3,777,730
Supportive Housing							
Capital (State)	285	\$5,630	\$0	\$5,630	\$1,604,550	\$0	\$1,604,550
Rental (State)	520	\$0	\$0	\$0	\$0	\$0	\$0
Capital (City x HPD)	1087	\$0	\$4,293	\$4,293	\$0	\$4,666,369	\$4,666,369
Capital (City x HRA)	258	\$0	\$5,997	\$5,997	\$0	\$1,547,171	\$1,547,171
Capital (City x State)	78	\$5,630	\$0	\$5,630	\$439,117	\$0	\$439,117
Rental (City)	3	\$0	\$0	\$0	\$0	\$0	\$0
Total	3615				\$9,835,373	\$6,213,540	\$16,048,913

Calculating Average Total Costs Per NY/NY Housing Unit and Per Housing Placement

The debt service, social service, and operating costs are now combined and averaged across housing types in table B.7. to come up with more complete cost estimates. Each of these cost estimates, i.e. estimates that aggregate two or more subtypes of housing, represents a weighted mean as determined by the number of housing units and specific costs that are associated with each housing subtype. Federal tax credit costs have been added here, along with the debt service costs in this final table, although only 20 percent of federal tax credit revenue was applied to capital expenses. The remaining 80 percent of tax credit revenue was used to fund operating reserves. Tax credit costs are assumed to pay out over the first 15 years of the project, but are assumed as a constant annual cost here (see also footnote 24).

The total combined cost per unit per year, for all NY/NY units, is estimated at \$18,190.⁴⁰ Breaking down this estimate, Community Residence housing is costlier, per unit, than Supportive Housing (\$19,662 versus \$17,277, respectively). Social services and operating costs account for 73 percent of the total estimated per-unit cost; and NYS provides, on average, 78 percent of the estimated per-unit cost.

⁴⁰ Excluding Medicaid, for the 128 CR units noted earlier.

Table B.7. Estimated Unit Costs to Federal, State, and City Sources for NY/NY Housing Averaged Over Housing Types

Housing Type	Net Service and Operating Costs					
	Units	Federal	State	City	Subtotal	
Community Residence	1,384		\$0	\$14,032	\$0	\$14,032
Supportive Housing	2,231	\$2,429		\$9,813	\$575	\$12,817
Total	3,615	\$1,499		\$11,428	\$355	\$13,282
	Debt Service Costs					
	Units	Federal	State	City	Subtotal	
Community Residence	1,384		\$0	\$5,630	\$0	\$5,630
Supportive Housing	2,231	\$759 ⁴¹		\$916	\$2,785	\$4,460
Total	3,615	\$468		\$2,721	\$1,719	\$4,908
	Total Costs					
	Units	Federal	State	City	Total	
Community Residence	1,384		\$0	\$19,662	\$0	\$19,662
Supportive Housing	2,231	\$3,188		\$10,729	\$3,360	\$17,277
Total	3,615	\$1,967		\$14,149	\$2,074	\$18,190

To facilitate comparisons of the housing costs reported here and the collateral service utilization reductions reported in the accompanying paper, the housing costs have been converted into annualized costs per placement in table B.8. The annualized per unit costs (from table B.7.) were converted into per diem costs through multiplying them by the average annualized length of tenure over the first two years following placement, .746 (Lipton 1996). This yields an *annualized per placement* cost of \$13,570. (This approach is consistent with the approach used in the service utilization analysis.).

Table B.8. Estimated Per Annum, Per Diem, and Per Placement Per Year Costs

Housing	Units	Annual Per Unit Cost	Annualized Per Placement Cost
Community Residence (mean)	1,384	\$19,662	\$14,668
Supportive Housing (mean)	2,231	\$17,277	\$12,889
Weighted mean	3,615	\$18,190	\$13,570

Alternatively, one could also compare the housing costs and service system cost reductions by converting the *per placement per year* service utilization reductions reported in the accompanying paper into *per housing unit per year* units, by applying the same set of assumptions. As shown in table B.9., the service utilization reductions by service type, adjusted for case-control differences, can be expressed in terms of the annualized cost reductions per placement (also shown in the last column of table 18 in the article). These annualized per placement reductions can be expressed in terms of annualized cost reductions *per unit* by adjusting for the housing retention rate. This is done by multiplying the annualized per

⁴¹ This per unit cost reflects the cost associated with the Federal Tax Credit, paid over the first 15 years of each project. Overall, twenty percent of this went for debt service, and the remainder went for operating reserves, to be used in the event that Section 8 support stopped on units after their initial five-year commitment.

placement reductions by 1.34 (the annualized number of tenants per average housing unit)⁴². This procedure yields *turnover adjusted and annualized cost reductions* attributable to the full-year housing placement, of \$16,282 per unit per year. This figure can then be compared to the estimated costs of the housing units presented in this appendix, which have already been calculated in terms of the per unit per year costs, and which have also assumed year-round occupancy (with the exception of table B.8.).

Table B.9. Annualized Cost Reductions Adjusted for Housing Turnover: Per Unit and for Total NY/NY Housing Units (N=3,615), by Type

Service Provider	Annualized Cost Reductions	Annualized Turnover-Adjusted Cost Reductions
Dept. of Homeless Services	\$2,819	\$3,779
Office of Mental Health	\$6,162	\$8,260
Health and Hosp. Corp.	\$1,321	\$1,771
Medicaid – Inpatient	\$2,825	\$3,787
Medicaid – Outpatient (stays)	-\$1,982	-\$2,657
Veterans Administration	\$444	\$595
Dept. of Corrections (State)	\$312	\$418
Dept. of Corrections (City)	\$245	\$328
Total	\$12,145	\$16,282

Conclusion

This paper has presented estimates of costs borne by the City and State of New York and the federal government for the construction, operation, and service provision associated with NY/NY housing. City and state program administrators served as sources for the cost information, and reflect costs assessed in 1999 dollars. It must also be reiterated that these cost estimates are not comprehensive, but rather reflect the assistance provided by the federal, state, and city governments to nonprofit housing and service providers to administer this housing. Additional funding may come from the non-profit agencies themselves, and from tenant rent contributions that are otherwise not deducted here.⁴³

NY/NY housing reflects a diverse range of housing and service configurations, which correspond to a wide range of expenses for the different types of housing. In the process of combining the different types of housing, the average costs produced also become less representative of the individual types of housing. While the average figures are useful for comparing NY/NY housing costs to potentially offsetting cost reductions brought on by reductions in collateral service use, such as psychiatric hospitals, other public and private hospitals, homeless shelters and corrections programs, future research should be refined by breaking down cost calculations by the specific programs, and by specific tenancy histories.

⁴² 1.34 represents the reciprocal of the rate of turnover, .746.

⁴³ Medicaid-paid services to tenants are excluded, which pay for the services delivered in 128 of the CR units.