

# Housing Boston's Chronically Homeless Unsheltered Population 14 Years Later

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**Objective:** The long-term outcomes of permanent supportive housing for chronically unsheltered individuals, or rough sleepers, are largely unknown. We therefore assessed housing outcomes for a group of unsheltered individuals who were housed directly from the streets after living outside for decades.

**Methods:** Using an open-cohort design, 73 chronically unsheltered individuals were enrolled and housed in permanent supportive housing directly from the streets of Boston from 2005 to 2019. Through descriptive, regression, and survival analysis, we assessed housing retention, housing stability, and predictors of survival.

**Results:** Housing retention at  $\geq 1$  year was 82% yet fell to 36% at  $\geq 5$  years; corresponding Kaplan-Meier estimates for retention were 72% at  $\geq 1$ , 42.5% at  $\geq 5$ , and 37.5% at  $\geq 10$  years. Nearly half of the cohort (45%) died while housed. The co-occurrence of medical, psychiatric, and substance use disorder, or "trimorbidity," was common. Moves to a new apartment were also common; 38% were moved 45 times to avoid an eviction. Each subsequent housing relocation increased the risk of a tenant returning to homelessness. Three or more housing relocations substantially increased the risk of death.

**Conclusions:** Long-term outcomes for this permanent supportive housing program for chronically unsheltered individuals showed low

housing retention and poor survival. Housing stability for this vulnerable population likely requires more robust and flexible and long-term medical and social supports.

**Key Words:** unsheltered, rough sleepers, chronically homeless individuals, permanent supportive housing

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Homelessness in the United States is a complex public health issue intersecting many areas of society. In January 2019, an estimated 567,715 people in the United States were experiencing homelessness.<sup>1</sup> Thirty-seven percent were unsheltered individuals or "rough sleepers," who sleep outside or in areas not meant for human habitation, an increase of 9% from 2018.<sup>1</sup> Nearly two-thirds of adults who are homeless for a year or longer are unsheltered, and have worse health outcomes, experience homelessness longer, and have higher mortality rates than those who are sheltered.<sup>1–6</sup>

Permanent supportive housing (PSH) combines affordable housing with services and is based upon the "Housing First" model rather than linear model of housing readiness.<sup>7</sup> Barriers are removed and housing, offered directly from the streets and shelters, becomes the foundation for the delivery of an array of health and social services. Unsheltered individuals, among the sickest and most vulnerable, with high utilization of hospitals and emergency departments, have been the focus for PSH.<sup>2–6,8,9</sup>

Few studies have followed housing outcomes and retention for this vulnerable population for longer than 1–2 years. Pathways to Housing, utilizing an assertive community treatment (ACT) team to support tenants 24 hours a day, housed 242 street-dwelling mentally ill homeless adults and had a retention of 88% at 5 years, compared with 47% for those housed through traditional or linear housing.<sup>7,10</sup> PSH has the potential for housing stability for chronically homeless adults<sup>11</sup>; however, few programs have had the robust supports of the Pathways study and long-term outcomes remain unclear. With the exception of individuals with human immunodeficiency virus infection and acquired immunodeficiency syndrome (HIV/AIDS), no study has yet demonstrated that PSH either improves health or reduces costs.<sup>11</sup>

We conducted a 14-year longitudinal open-cohort study of a Medicaid funded PSH program for unsheltered

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individuals from 2005 to 2019 to describe the characteristics of the cohort, determine housing retention trends, and examine predictors of housing stability and survival.

## METHODS

### Housing Model

We examined the Community Support for People Experiencing Chronic Homelessness (CSPECH) PSH program in Boston, a collaborative housing program between Boston Health Care for the Homeless Program (BHCHP), a Federally Qualified Health Center, and HomeStart, a non-profit housing agency, that houses chronically unsheltered individuals directly from the streets. CSPECH, begun in 2005 as the first PSH program in the country to use Medicaid to pay for housing stabilization, is now permanent and one of several PSH programs in Boston.<sup>12</sup> CSPECH adheres to Housing First principles, but rather than an ACT team, provides housing stabilization through housing workers at HomeStart in collaboration with BHCHP's medical and behavioral health care services.<sup>7</sup>

In September 2005, the US Department of Housing and Urban Development (HUD) issued 24 market-rate continuously funded vouchers to HomeStart for independent, scattered-site apartments for chronically homeless unsheltered individuals. HomeStart conducts housing searches and provides stabilization and representative payee services. Medicaid is billed through BHCHP. Twelve housed persons work with 1 housing worker, available weekdays.

BHCHP's multidisciplinary Street Team delivers integrated primary and behavioral health care directly to patients on the streets, in apartments, at clinic, when inpatient, and at BHCHP's medical respite program, a 124-bed medical respite program with 24-hour nursing. The Street Team is available 24 hours a day and conducts regular home visits to all housed patients, not only those housed through CSPECH.

HomeStart and the Street Team meet regularly to coordinate and integrate care. Daily phone calls keep information current between meetings. Whenever possible clinicians and housing workers "co-locate" visits.

### Design and Setting

During this open-cohort 14-year prospective study, 73 chronically unsheltered adults were enrolled and housed. One additional person, not enrolled, declined a voucher. Tenants obtain vouchers on a rolling basis. When a tenant dies, is terminated, leaves voluntarily, or is too sick to live independently, a new referral is made, and the voucher is transferred to another person. The first tenant was housed on October 06, 2005 and the last on March 29, 2019. Data were analyzed from October 2005 to 2019. All participants were followed prospectively from their enrollment date until October 2019, date of death, date of termination, or date of leaving the program. Data collected are dates of move-in and move-out, reason for move-out, apartment address, apartment size, and dates, causes, and locations of deaths. Problem lists from BHCHP electronic medical record were reviewed for diagnoses and compiled to describe tenants' trimorbidity. Apartments are located throughout Greater Boston. Move-ins occur at the beginning of the week to allow tenants time to

settle-in before the weekend when less support is available. Utilities and cable are activated before move-ins.

Participants are 18 years old and above, a primary care patient of BHCHP's Street Team, sleeping unsheltered, and has or is eligible for Medicaid and entitlements (eg, Supplemental Security Income). Sobriety is not a requirement. Eligible patients are referred to HomeStart by the Street Team. Patients who have been Street Team patients the longest are referred first. The study meets Institutional Review Board approval.

### Analyses

We described demographics, trimorbidity, characteristics of apartments, time in housing and per apartment, and mortality. To determine housing retention trends, we calculated a proportion, a common method of reporting retention, and conducted survival analysis.<sup>7,13-15</sup> The number of people in the program was divided by the number of people housed for  $\geq 1$ ,  $\geq 5$ ,  $\geq 10$  years and continuously, or participants with only 1 apartment or who moved without lease violations and without a time-gap to another apartment.

We analyzed predictors of housing stability, retention, and survival using STATA 15.1. To model housing stability, or risk of rehousing over time, we used Poisson regression assuming housing and rehousing were separate events. The dependent variable was the ratio of average housing stays, calculated by dividing time in housing by number of housing events. Higher estimates denoted longer average times in housing. Independent variables were demographics. To model probability of retaining housing, or time to next housing location, we used time-varying Cox Proportional Hazard regression. The dependent time-to-event variable was housing loss. To model the probability of survival, we used a second time-varying Cox model assuming each housing occurrence was conditional on the last. The dependent time-to-event variable was death. Independent variables for both Cox models were demographics and number of moves.

## RESULTS

### Cohort Characteristics

Average age at first placement was 52 years. Over three-quarters were Non-Hispanic White males. The cohort had high proportions of trimorbidity. Nearly all smoked but only 73% had documented cigarette use in their charts. Nearly half required a move to preserve their housing and 38% were moved 45 times to avoid eviction; that is, housing workers moved a person before an eviction would appear on their housing record. Common psychiatric diagnoses were mood disorders with too few schizophrenia diagnoses to report (Table 1).

During the study, 45% died (Table 1). One died in transition from 1 apartment to the next. Sixty-one percent of the deaths occurred in apartments, 18% in hospitals, 12% on the street, and 9% in respite or hospice. Eight died from cirrhosis or gastrointestinal bleeding, 7 from heart disease, 6 from cancer, 5 from accidental overdoses, and a <5 from chronic substance use disorders, HIV/AIDS, or renal disease.

### Housing Retention

Housing retention was 82% at  $\geq 1$ , 36% at  $\geq 5$ , and 12% at  $\geq 10$  years. Corresponding Kaplan-Meier estimates

**TABLE 1.** Cohort Characteristics and Housing Outcomes (N = 73\*)

Characteristic	N (%)
Age (Average 51.8 y)	
35–54 y	48 (66)
55–64 y	25 (34)
Race/ethnicity	
Non-Hispanic White	56 (77)
Persons of color <sup>†</sup>	17 (23)
Sex	
Men	56 (77)
Women	17 (23)
Trimorbidity <sup>‡§</sup>	63 (86)
Medical conditions	
Gastroesophageal reflux	39 (53)
Chronic obstructive pulmonary disease	33 (45)
Hypertension	32 (44)
Hepatitis C	27 (37)
Osteoarthritis	25 (34)
Psychiatric illnesses	69 (95)
Major depression disorder	44 (60)
Posttraumatic stress disorder	25 (34)
Generalized anxiety disorder	38 (52)
Bipolar disorder	14 (19)
Substance use disorders	68 (93)
Alcohol use disorder	61 (84)
Tobacco use disorder	53 (73)
Polysubstance use disorder	31 (43)
Opioid use disorder	14 (19)
Maximum number of apartments	
1 Apartment	38 (52)
2 Apartments	19 (26)
3 Apartments	7 (10)
4–6 Apartments	9 (12)
Apartment type	
One bedroom	47 (64)
Studio	26 (36)
Housing retention	
Continuously housed <sup>  </sup>	38 (52)
Housed for ≥ 1 y	60 (82)
Housed for ≥ 5 y	26 (36)
Housed ≥ 10 y	9 (12)
Terminated	10 (14)
Evictions	8 (11)
Time in housing and in transition (y)	
Cumulative time in housing and in transition	354.3
Cumulative time in housing	333.8
Cumulative time in transition	20.5
Lengths of stay	
Longest	12.7 y
Shortest	48 d
Per person	4.5 y
Per apartment	2.4 y
Deaths	33 (45)

\*No missing data.

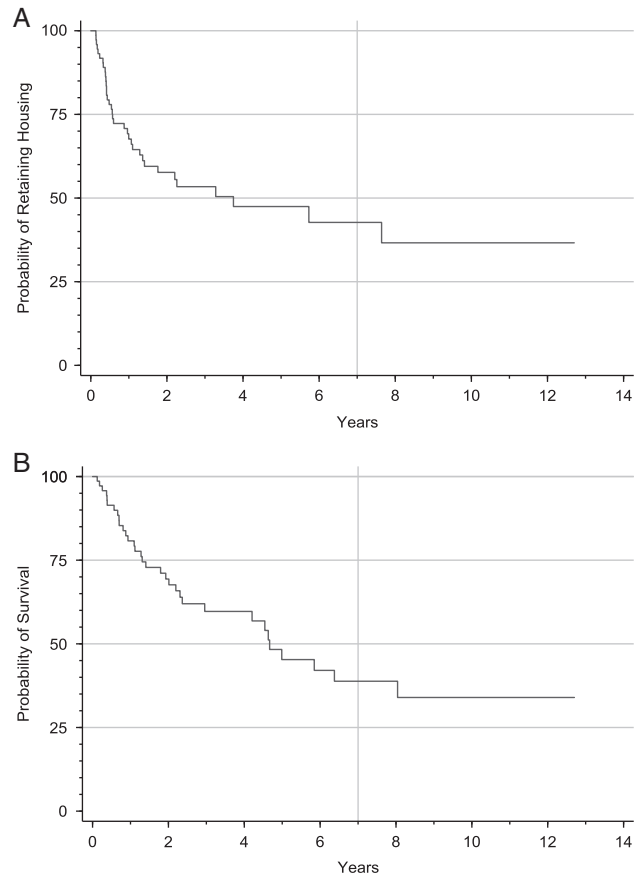
<sup>†</sup>Persons of color include individuals who identified race and/or ethnicity as Non-Hispanic Black, Native American, or Hispanic.

<sup>‡§</sup>Specific conditions listed for medical, psychiatric, and substance use disorder were the most common in the cohort.

<sup>§</sup>Trimorbidity refers to individuals who have co-occurring medical illnesses, mental health disorders, and substance use disorders.

<sup>||</sup>Continuously housed was defined as someone who lived in only 1 apartment or who did not move for lease violations.

were 72% at ≥ 1, 42.5% at ≥ 5, and 37.5% at ≥ 10 years (Fig. 1A). Time in transition between apartments was low (6%) (Table 1).



**FIGURE 1.** Kaplan-Meier Estimates for Retention and Survival. Curves in both graph A and B are Kaplan-Meier Curves for the study cohort Years 1–14 are the corresponding years of the study, 2005–2019.

**Statistical Analyses**

Small rate ratios indicated better housing stability or fewer moves, predicted by older age and Persons of Color. Larger rate ratios were associated with less housing stability and more moves, predicted by being female (Table 2). Two prior moves were associated with 11.5 (3.0, 43.9) times higher risk of housing loss and ≥ 3 moves were associated with 26.6 (2.5, 238.0) times higher risk of housing loss (Table 2). An increased risk of death was found with subsequent moves and Persons of Color had a lower risk of death than Non-Hispanic White race/ethnicity (Table 2). Kaplan-Meier estimates indicated a probability of survival of < 50% at 5 years (Fig. 1B).

**DISCUSSION**

A Medicaid-funded scattered-site PSH program for chronically unsheltered individuals in Boston found high mortality, low housing stability, and poor long-term housing outcomes.

Consistent with previous housing studies, 82% were still housed after 1 year.<sup>7</sup> However, housing retention dropped precipitously in the following years with 36% in housing at ≥ 5 years and 12% at ≥ 10 years. Housing programs in Massachusetts have also reported high retention at 1–2 years.

**TABLE 2.** Regression and Survival Analysis Results for Housing Stability, Time to Next Housing Relocation, and Time to Death (N = 73\*)

Characteristic	Housing Stability		Time to Next Housing Relocation		Time to Death	
	Adjusted Rate Ratio (95% CI)	P (0.05)	Adjusted Hazard Ratio (95% CI)	P (0.05)	Adjusted Hazard Ratio (95% CI)	P (0.05)
Age (y)						
35–54	1.0		1.0		1.0	
55–64	0.5 (0.3–0.8)	0.01	0.7 (0.3–1.6)	0.38	0.7 (0.3–1.6)	0.41
Race/ethnicity						
Non-Hispanic White	1.0		1.0		1.0	
Persons of color <sup>†</sup>	0.4 (0.3–0.6)	<0.0001	0.6 (0.2–1.3)	0.19	0.3 (0.1–0.9)	0.03
Sex						
Men	1.0		1.0		1.0	
Women	1.7 (1.2–2.5)	0.01	1.8 (0.8–3.8)	0.13	1.2 (0.5–2.9)	0.68
Number of prior moves						
No prior move			1.0		1.0	
1 prior move			1.3 (0.6–3.1)	0.51	2.2 (1.0–4.8)	0.04
2 prior moves			11.5 (3.0–43.9)	<0.0001	0.8 (0.2–3.6)	0.75
≥ 3 prior moves <sup>‡</sup>			26.6 (2.5–238.0)	0.01	48.4 (8.1–287.7) <sup>§</sup>	<0.0001

\*No missing data.

<sup>†</sup>Persons of color include individuals who identified their race and/or ethnicity as Non-Hispanic Black, Native American, or Hispanic.

<sup>‡</sup>Participants in the housing program had up to 6 apartments but too few people had 5 and 6 apartments to report separately.

<sup>§</sup>The hazard ratios for ≥ 3 prior moves are less stable due to the smaller numbers for this cell.

CI indicates confidence interval.

Pine Street Inn, the largest homeless shelter and housing provider in New England, found 91% remain in housing after 1 year.<sup>16</sup> HomeStart reported 95% remained housed for 2 years.<sup>17</sup> Massachusetts Housing and Shelter Alliance reported 93% retention at 2 years.<sup>13</sup> Some studies count time in the program or time stably housed, which may inflate housing retention or obscure the number of moves needed to obtain housing stability.<sup>7,14</sup> Yet, few studies have followed housing outcomes beyond 1–2 years and currently no standards for assessing housing retention exist.

The number of moves to new apartments to avoid evictions was a challenge. Nearly half in our study required > 1 apartment to remain housed, with many requiring 3–6 apartments. While only 8 persons were evicted, 28 tenants were moved a total of 45 times to avoid eviction. The high number of moves contributed to retention erosion in our study.

The housing vouchers were for independent, scattered-site apartments and the inflexibility of these vouchers may have been a mismatch for the overwhelming burden of trimorbidity of the cohort, all of whom had been living chronically on the streets of Boston for decades and lacked the skills needed to maintain an apartment alone. Our study cohort bore a complex burden of illness which also contributed to retention erosion; 86% had trimorbidity and thus may differ from cohorts in other housing studies. Higher housing retention and fewer moves have been seen in programs designed for those with severe and persistent mental illnesses; our unsheltered cohort suffered primarily from co-occurring medical conditions and addictions, but not schizophrenia and other psychotic disorders.<sup>7,14</sup> PSH with similar levels of substance use to our study cohort had a high housing retention (83%) at 2 years, although they had a single site model.<sup>15</sup>

The chronically unsheltered population is sicker, has higher mortality rates, different utilization patterns, more substance use disorders, different psychiatric diagnoses, and

is homeless for longer than other subgroups representing lifetime deprivation.<sup>2–6,9</sup> They differ demographically from the overall homeless population. The supportive services, essential to the PSH model, may not have been sufficient to address the needs of this unsheltered population. A continuum of housing options, combined with flexible, robust, and long-term health and social services, may be necessary to improve and address their extreme social disparities.<sup>18</sup>

The unsheltered population suffers from high mortality rates, but the number of deaths in our study was higher than expected.<sup>2,6</sup> The risk of death increased with each move to a new apartment shown by our survival analysis.

This study had limitations. The age range was small due to the requirement for Medicaid eligibility. More than three-quarters were men and of Non-Hispanic White race/ethnicity, indicating low variation. However, these limitations were offset by the referral process through which those on the streets for the longest time were housed first. In addition, the demographics of the study cohort reflect the demographics of the overall unsheltered population in Boston as well as the unsheltered population of the United States.<sup>1,2</sup> Thus, the results are generalizable to unsheltered populations in urban areas. The cohort size was small compared with some housing studies as we examined 1 PSH in Boston; however, there were no losses to follow-up and this is the first study to describe and follow unsheltered individuals long-term in PSH. Future studies are needed with a comparison group and investigation of substance use patterns.

## CONCLUSIONS

While the National Academies of Science, Engineering, and Medicine in 2018 found no evidence in the literature that PSH either improved health or reduced expenditures for

chronically homeless persons, PSH was noted to have the potential for ending chronic homelessness given some studies showed high housing retention after 1–2 years.<sup>11,19</sup> However, without standards for outcomes such as retention and PSH model elements such as type of housing and supportive health and social services, housing will be rehousing for this group.

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