

Final Report

Permanent Supportive Housing, Transitional Supportive Housing and Emergency Single Room Occupancy HASA Housing Pilots: Enrollments from September 21, 2018 to August 31, 2022

Report Prepared for:
New York City Department of Social
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Report Prepared by:
CUNY Institute for Implementation Science in
Population Health

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- **City University of New York, Institute for Implementation Science in Population Health:** Diane Addison, Denis Nash and McKaylee Robertson.
- **Housing Works:** Charles King, Virginia Shubert, and Gregory Wersching.
- **New York City Department of Health and Mental Hygiene:** Sarah Braunstein, Ellen Wiewel and Yaoyu Zhong.
- **New York City Department of Social Services:** Kinsey Dinan, Jacqueline Dudley, Angela Ghesquiere, John Rojas, Samuel Salnave, and Maaz Siddiqui.

Executive Summary

Background: The HIV/AIDS Services Administration (HASA) initiated the Permanent Supportive Housing (PSH) pilot and Transitional Supportive Housing (TSH) pilot in September 2018, and the Emergency Single Room Occupancy (ESRO) housing pilot in May 2019. The pilots featured specialized units of HASA caseworkers whose caseloads were determined based on housing type. The pilots presumed that residents of TSH or ESRO units were in greater need of intensive HASA intervention, while clients living in PSH units, particularly durably virally suppressed clients, were more stable and needed a less intensive touch from HASA. In the full HASA caseload, the three housing types included in the pilot together accounted for approximately one-quarter of HASA households.

Pilot description: The caseload ratio was decreased to 25:1 for HASA caseworkers in the TSH or ESRO pilot and increased to 50:1 for HASA caseworkers in the PSH pilot. The TSH and ESRO caseload ratios were lower than non-pilot caseload ratios, and the PSH caseload ratio was higher than non-pilot caseload ratios. Other notable changes to standard practice across all three pilots included: 1) housing-specific assignment, e.g., individual HASA caseworkers had all TSH clients at pilot housing provider sites versus HASA caseworkers with a mix of clients based on housing categories (e.g., TSH, PSH, or ESRO) at non-pilot sites, and 2) HASA and housing providers prioritized case support related to viral suppression and health promotion. HASA caseworkers were also responsible for gaining client consent to use a health information exchange (Healthix) for up to date clinical information, and pilot caseworkers were trained on Healthix before non-pilot caseworkers and had more access to Healthix information than non-pilot caseworkers. The purpose of involving Healthix in the pilots was to allow client demographic and laboratory data on HIV treatment outcomes to be shared amongst participating providers. Healthix, which serves patients throughout New York State, is the largest health information exchange in the country, with over 8,000 participating facilities and 20 million patients.

Hypotheses:

- 1) We hypothesized that VLS among PWH enrolled in the PSH pilot would not be different than PWH who received traditional PSH, despite a higher caseload to caseworker ratio in the pilot relative to the traditional PSH model (50:1 ratio in pilot, versus ~34:1 ratio in non-pilot), and given a PSH pilot caseworker model that was focused on single-clients with housing specific assignment versus the traditional caseworker model, which includes a mix of single and family clients across housing types (PSH, TSH and ESRO).
- 2) For the TSH and ESRO pilots, we hypothesized that PWH enrolled in the pilot would have greater VLS relative to PWH in traditional model, given the lower caseload to caseworker ratio (25:1 in pilot versus ~34:1 in non-pilot) and a pilot caseworker model focused on single-clients with housing specific assignments versus the traditional model.

Aim: The aim of the report is to: 1) describe available data on pilot fidelity and the implementation processes of all three pilots, and 2) compare health outcomes (viral load

suppression (VLS), stable housing, and durable viral suppression (DVS)) among persons living with HIV (PWH) who were enrolled in the HASA pilot with VLS among PWH who were enrolled in traditional housing (non-pilot/control) models.

Methods: In the PSH and TSH pilots, clients were assigned to a caseworker based on assignment to a pilot housing provider or pilot unit. In the ESRO pilot, clients were randomly selected for the pilot. To demonstrate the real-world effects of the pilot intervention, which includes short enrollment periods, we included enrollments through February 2022 for 6-month outcomes of VLS and stable housing and enrollments through August 2021 for 12-month DVS outcomes. The pilots were paused due to COVID-19 from March 20-July 6, 2020 with HRA and housing vendor staff efforts, in pilot and non-pilot arms, redirected to address health and safety issues pertaining to COVID-19. For primary analyses, we focused on enrollments that were not exposed to the COVID-19 pause. We used a log binomial regression model to generate risk ratios estimating the effectiveness of each pilot on VLS.

Results

- The target enrollment number was based on the a priori power calculation for the VLS outcome. Among the subgroups *unexposed* to the COVID-19 pause, the PSH pilot met target enrollments for the pilot and non-pilot arms. The TSH pilot was slightly underenrolled for the pilot arm but exceeded enrollment for the non-pilot arm (non-pilot: 4,610 enrollments versus 3,400 target). The ESRO pilot was underenrolled for the pilot arm and non-pilot arm (non-pilot: 7,107 enrollments versus 12,120 target).
- As of June 2022, the PSH and TSH caseload ratios were lower-than-planned, and for PSH, the caseload ratios were unexpectedly lower than the non-pilot arm. The ESRO pilot caseload ratio was as expected.

Performance Key	
Aligned with Goals	
Neutral toward Goals	
Not Aligned with Goals	

Table 1. Summary of Performance with Respect to Outcomes and Implementation Process Measures for Permanent Supportive Housing, Transitional Supportive Housing, and Emergency Single Room Occupancy Relative.

	Pilot Enrollment: Observed (Target)	Caseload Ratio: Observed / Expected	% Successful Visit (Pilot [Non-Pilot])*	% Healthix Consent (Pilot [Non-Pilot])	Median Enrollment Duration (Pilot [Non-Pilot] days)	Stable Housing – 6 Months aRR (95% CI)	VLS – 6 Months aRR (95% CI)	DVS aRR (95% CI)
PSH	380 (370)	37:1/50:1	26.5 [38.9]	63.6 [43.1]	1214 [1254]	0.99 (0.97, 1.01)	1.03 (0.99, 1.07)	1.05 (0.98, 1.11)
TSH	868 (1300)	18:1/ 25:1	52.2 [33.3]	44.9 [38.9]	139 [79]	1.04 (0.91, 1.18)	1.06 (1.01, 1.11)	1.13 (1.05, 1.22)
ESRO	405 (840)	27:1/25:1	26.5 [25.9]	40.7 [38.6]	272 [122]	0.74 (0.55, 1.00)	1.08 (0.99, 1.17)	1.11 (0.88, 1.39)
Permanent Supportive Housing (PSH); Transitional Supportive Housing (TSH); Emergency Single Room Occupancy (ESRO); Viral Load Suppression (VLS); Durable Viral Suppression (DVS)								
VLS, Stable housing, enrollment numbers and median enrollment time include enrollments through February 2022.								
DVS: enrollments through August 2021.								
Pilot caseload ratio as of June 2022.								
% Healthix consent, and % successful visit documented include enrollments through August 2022.								
*Characterizes the % with a visit every 183 days in PSH and every 90 days in TSH and ESRO.								
In PSH, the expected frequency of visits was every 183 days in the pilot versus every 90 days in the non-pilot.								

In TSH and ESRO, the expected frequency was a visit every 30 days in pilot and non-pilot arms.
PSH and TSH pilot clients are compared to non-pilot clients in respective housing type.
ESRO pilots were randomly selected for the pilot are compared with ESRO clients who were not randomly selected

- The frequency of successful visits every 182 days was lower in the PSH pilot than non-pilot arm. The frequency of successful visits every 90 days was higher in the TSH pilot than non-pilot arm, and the frequency was similar in the ESRO pilot and non-pilot arms.
- In the TSH and ESRO pilots, the median enrollment duration was longer than non-pilot enrollment duration.
- With respect to the stable housing outcome, results were mixed across housing types. In the PSH and TSH pilots, there was no difference in the likelihood of stable housing. The likelihood of stable housing was lower among those randomly selected for the ESRO pilot enrollment compared with non-pilot enrollments.
- In models adjusted for clinical and sociodemographic differences, the PSH pilot did not worsen VLS or DVS among those enrolled compared with those who did not enroll. The TSH pilot enrollees had greater likelihood of VLS and DVS compared with non-pilot TSH enrollees, although the relative effect was small.
- Among those randomly selected for the ESRO pilot, the enrollees had a small increased likelihood of VLS when compared with those who were not randomly selected for the pilot. The ESRO pilot impact on DVS was positive but had wide 95% confidence interval.

Conclusions:

- The impact of the PSH and TSH pilots on VLS and on DVS was aligned with the goals of the pilots and increased VLS among TSH clients without worsening outcomes among PSH clients. However, the actual PSH and TSH pilot caseload ratios were lower than planned, and increasing the caseload ratio during implementation may change the effect of the pilot model on VLS and DVS.
- Among clients randomly selected for the ESRO pilot, VLS was slightly higher than among clients in the non-pilot ESRO. Notably, the ESRO pilot was underenrolled and included less than half of the target number of enrollments in the pilot arm. The ESRO pilot may have improved VLS; however, the interpretation of the pilot impact on DVS is less clear. The estimated relative risk for DVS had a wide 95% confidence interval of 0.89-1.39, indicating a range of plausible true effects of the pilot, from reducing to increasing DVS, and including the possibility of no effect. The small sample in the ESRO pilot likely limited statistical power, and the similar visit frequency relative to non-pilot arm may have reduced pilot impact. Both components, the small sample and pilot implementation, may have contributed to the wide DVS confidence interval.
- An unintended consequence of the TSH and ESRO pilots was the increased enrollment duration relative to non-pilot arms. In the case of the ESRO pilot, the median enrollment duration was more than double the non-pilot enrollment duration. The finding of lower stable housing among ESRO pilot clients is directly due to the increased enrollment duration since ESRO housing is classified as unstable. Notably, the increased enrollment duration in TSH or ESRO housing did not negatively impact VLS or DVS.

- The pilots were paused for 3 months at the start of the COVID-19 pandemic, which impacted sample sizes and HRA activities, which were redirected to address health and safety pertaining to the COVID-19 pandemic. The broader impact of the COVID-19 on the pilots is difficult to assess.

Contents

Executive Summary.....	3
Table 1. Summary of Performance with Respect to Outcomes and Implementation Process Measures for Permanent Supportive Housing, Transitional Supportive Housing, and Emergency Single Room Occupancy Relative.....	4
Abbreviations	9
Pilot Overview	10
Selection Process for Pilot.....	11
Table 2. Key Elements of the Pilots: PSH, TSH and ESRO Models.....	11
Table 3. Pilot Milestones.....	12
Report Aims.....	13
Methods.....	13
Data Sources	13
NYC Department of Health and Mental Hygiene (Health Department) HIV Surveillance Registry	13
HASAWeb data shared with the Health Department	13
Measures.....	14
Index Date	14
Primary Outcome	14
Secondary Outcomes	14
COVID-19 Pause	14
Figure 1. Timeline of Pilot Enrollments, COVID Pause, and Outcome Monitoring.....	15
Successful Visits	15
Covariates	15
Statistical Analysis.....	15
Enrollments.....	17
Table 4. Enrollment Numbers for Fidelity and Effectiveness Analyses.....	17
Fidelity and Implementation Results	18
Table 5. Number of Client Enrollments in the PSH and TSH Pilots from September 24, 2018 to August 31, 2022 and in the ESRO Pilot from May 28, 2019 to August 31, 2022	18
Table 6. Caseload Ratios Across Reporting Periods	18
Table 7. Proportion of Pilot and Non-Pilot Clients with Healthix Consents.....	19
Table 8. Average Visit Frequency by Housing and Pilot Status.....	19
Effectiveness Results.....	21
Characteristics of Pilot versus Non-Pilot Clients.....	21

Table 9. Characteristics of PSH Pilot versus Non-Pilot Clients Enrolled from September 24, 2018 to February 28, 2022	21
Table 10. Characteristics of TSH Pilot versus Non-Pilot Clients Enrolled from September 24, 2018 to February 28, 2022	23
Table 11. Characteristics of ESRO Pilot versus Non-Pilot Clients Enrolled from May 28, 2019 to February 28, 2022	25
Impact on Viral Load Suppression and Durable Viral Suppression.....	26
Table 12. Pilot Impact on 6-Month Viral Load Suppression – Enrollments through February 28, 2022	26
Viral Suppression by Duration and Timing of Enrollment.....	27
Table 13. Pilot Impact on Durable Viral Load Suppression (DVS) from 3-12 Months Post Enrollment - Among Clients Unexposed to Pause and Enrolled as of August 2021	27
Impact on Stable Housing and Other Housing Types	28
Table 14. Pilot Impact on Housing Types: Stable, Transitional, Emergency (non-Transitional), or Unspecified Types at 12 Months– Among Clients Unexposed to Pause and Enrolled as of February 28, 2022	28
Discussion.....	29
Conclusions	32
Supplemental Tables.....	32
Supplemental Table 1. HASA Housing Type Classification for Stable Housing	32
Supplemental Table 2. Time-Varying Characteristics of Pilot versus Non-Pilot Clients at each Enrollment by Housing Category - Enrollments from September 24, 2018 to February 28, 2022.....	33
Supplemental Table 3. Viral Suppression Status at 6 Months Post-Enrollment by Housing Type, Duration of Enrollment – Among Enrollments Unexposed to the COVID Pause and Enrolled through February 28, 2022	33
Supplemental Table 4. Viral Load Suppression Six Months Following Enrollment by Housing Type and Timing of Enrollment	34
Supplemental Table 5. Pilot Impact on Housing Types: Stable, Transitional, Emergency (non-Transitional), or Unspecified Housing Types at 12 Months– Among Clients Unexposed to Pause and Enrolled as of February 28, 2022	34
References	35

Abbreviations

aRR	Adjusted Risk Ratio
CBO	Community-Based Organization
CI	Confidence Interval
Health Department	NYC Department of Health and Mental Hygiene
DSD	Differentiated Service Delivery
DVS	Durable Viral Suppression
ESRO	Emergency Single Room Occupancy
HASA	HIV/AIDS Services Administration
HRA	Human Resources Administration
IDU	Injection Drug Use
ICP	Integrated Care Planning
ITT	Intention to Treat
MOU	Memorandum of Understanding
MSM	Men who have Sex with Men
PSH	Permanent Supportive Housing
PWH	Persons with HIV/AIDS
RR	Risk Ratio
TSH	Transitional Supportive Housing
VLS	Viral Load Suppression

Pilot Overview

The HIV/AIDS Services Administration (HASA) is a program of the New York City Human Resources Administration (HRA) that serves low-income persons living with HIV in New York City.¹ HASA provides public benefits, case management, housing, and other services to its clients. HASA clients face barriers to effective care that can result in high utilization of health care services yet poor health outcomes.^{2–4} New collaborations among HASA and community-based partners offer the opportunity for integrated care planning and differentiated service delivery (DSD) strategies designed to better coordinate existing HASA resources with housing, health care, and psychosocial services to achieve improved HIV and housing outcomes for all HASA clients.

DSD is a patient-centered approach to HIV prevention and care that provides a framework for reexamining service delivery in order to tailor HIV services across the treatment cascade to reflect the needs and circumstances of different groups of people with HIV, reduce unnecessary burdens on systems of care, and refocus resources to target clients most in need.^{5,6} HASA, in collaboration with community partners, developed three demonstration projects that incorporated DSD principles in order to improve the experience of clients who moved through the HASA system and to make HASA services more efficient and better aligned with health care integration. These pilots were implemented for select clients living in PSH, TSH, and ESRO units. In the full HASA caseload, these three housing types account for approximately one-quarter of HASA households.

In September 2018, HASA initiated the Permanent Supportive Housing (PSH) pilot and Transitional Supportive Housing (TSH) pilot. Three housing providers participated in the TSH pilot, and four in the PSH pilot. In May 2019, HASA initiated the Emergency Single Room Occupancy (ESRO) housing pilot, with three emergency housing facilities. The pilot projects featured specialized units of HASA caseworkers whose caseloads were based on client acuity as indicated by housing status. Each pilot ran until August 2022. ESRO and TSH are considered temporary housing and PSH is considered permanent housing. PSH and TSH programs have onsite support services provided by the nonprofit managing the program. ESRO programs generally do not have onsite support services.

The pilots presumed that residents of TSH or ESRO housing were in greater need of intensive HASA intervention, while clients living in PSH, particularly durably virally suppressed clients, were more stable and in need of a less intensive touch from HASA. Consequently, HASA caseworkers in the TSH or ESRO pilot aimed for a 25:1 caseload ratio while HASA caseworkers in the PSH pilot aimed for a 50:1 caseload ratio. The TSH and ESRO pilot caseload ratios were lower than non-pilot caseload ratios, and the PSH pilot caseload ratio was higher than non-pilot caseload ratios.

Other notable changes to standard practice across all three pilots included: 1) housing-specific assignment, e.g., individual HASA caseworkers had all TSH cases at pilot housing provider sites versus HASA caseworkers with a mix of housing categories (TSH, PSH and ESRO) at non-pilot sites, and 2) HASA and housing providers prioritized case support related to viral suppression and health promotion. HASA caseworkers were also responsible for gaining client consent to use a health information exchange (Healthix) for up to date clinical information, and pilot caseworkers were trained on Healthix before non-pilot caseworkers and had more access to Healthix information than non-pilot caseworkers. The purpose of involving Healthix in the pilots was to allow client demographic and laboratory data on HIV treatment outcomes to be shared amongst participating providers. Healthix, which serves patients throughout New York State, is the largest health information exchange in the country, with over 8,000 participating facilities and 20 million patients.⁷

Selection Process for Pilot

- For the PSH or TSH pilot, there was one HASA caseworker unit per borough dedicated to the pilot. Clients were assigned to a caseworker based on assignment to a pilot housing provider or pilot unit. When a client left the pilot site, the client was assigned a new caseworker.
- For the ESRO pilot, caseworkers from two sites were asked to volunteer to participate in the pilot, or the least senior caseworker was selected as a pilot caseworker. HASA randomly selected 200 clients for the pilot. Client assignment to a caseworker was based on location of the client, and the desire to group a caseload for a caseworker by geographic location for ease of service/pilot delivery. To maintain 200 clients overall, the number of pilot clients was refreshed weekly.

Table 2 details the key pilot elements, aims, and intended outcomes. Table 3 details key pilot milestones. All pilots were paused from March 20 to July 6, 2020 due to the impact of the COVID-19 pandemic on HASA operations.

Table 2. Key Elements of the Pilots: PSH, TSH and ESRO Models

Pilot	Pilot design	Estimated # of unique clients to be enrolled over 3 years	Caseload to caseworker ratios <u>intervention</u> arm & type of clients	Caseload to caseworker ratios <u>control</u> arm & type of clients	Research aims and intended outcomes
PSH	Cohort study	~ 370 (intervention) ~4900 (control)	50:1 Single clients. Non-mix/single housing	Mandated 34:1 for single clients. 25:1 family cases. Mixed housing types	<u>Maintain</u> rates of VLS and housing outcomes (stability and transition to <u>independent living</u>) relative to non-pilot clients
TSH	Cohort study	~1300 (intervention) ~3400 (control)	25:1 Single clients. Non-mix/single housing	Mandated 34:1 for single clients. 25:1 family cases. Mixed housing types	<u>Improve</u> rates of VLS and housing outcomes (stability and transition to PSH) relative to non-pilot clients

Pilot	Pilot design	Estimated # of unique clients to be enrolled over 3 years	Caseload to caseworker ratios <u>intervention</u> arm & type of clients	Caseload to caseworker ratios <u>control</u> arm & type of clients	Research aims and intended outcomes
ESRO	Randomized Selection	~840 (intervention) ~12,180 (control)	25:1 Single clients. Non-mix/single housing	Mandated 34:1 for single clients. 25:1 family cases. Mixed housing types	Improve rates of VLS and housing outcomes (stability and transition to PSH or TSH) relative to non-pilot clients

Table 3. Pilot Milestones

Date	Pilot	Updates to Pilot	Rationale/Details
July, 2018	PSH/TSH	Motivational Interviewing training for staff	HASA staff conducted joint Motivational Interviewing training with PSH Providers on 7/17/18 and with TSH Providers on 7/25/18
July, 2018	PSH/TSH	Training on pilot procedures for housing providers	
September 18, 2018	PSH/TSH	Training on pilot procedures for HASA staff	Training on the PSH and TSH Housing pilot models for HASA staff on 9/18/18
September 21, 2018	PSH/TSH	Pilots Launched	
October 5, 2018*	PSH/TSH	HASA begun consenting people to Healthix	Pilots launched prior to Healthix trainings
October 19, 2018*	PSH	Dropped the moving-on component ^a .	Did not want clients to feel like they had to 'move on'. Pilot team had questions about how to correctly implement the move-on assessment
October 22, 2018	PSH/TSH/ESRO	Healthix consent trainings	Healthix consent trainings for HASA staff
November 7, 2018	PSH/TSH	Established a 'coordination meeting' for pilot clients	The first meeting should be with the provider and caseworker to review the roster of client.
November 16, 2018	PSH/TSH	All pilot staff trained on consenting to Healthix. Outside of the pilot, persons with a supervisor-2 title were trained	
April, 2019	PSH	25 cases transferred from SUS Jerome – Palladia Court site to new pilot site, West Farms/Comunilife – Congregate	SUS Jerome – Palladia Court site was closed.
April 8, 2019*	PSH/TSH	HASA uploading information daily to Healthix	
April, 2019	ESRO	Training on ESRO pilot procedures for HASA staff	Training on the ESRO Housing Pilot Model for HASA staff
May 24, 2019	ESRO	Cases randomly selected	
May 28, 2019	ESRO	Pilot launched	
July 2019	PSH/TSH	Refresher training on pilot procedures for housing providers	Housing providers requested additional training
March 20, 2020	All	Pilots suspended	Pilot suspended due to COVID-19. The suspension included but was not limited to new enrollments, assignments, placements, etc. Non-essential home visits were suspended, and all HASA clients are receiving weekly wellness calls.

Date	Pilot	Updates to Pilot	Rationale/Details
July 6, 2020	All	Pilots resumed	
August 31, 2022	All	Pilots ended	
<p>*These dates reflect the meeting where the milestone was discussed. Thus, the event may have occurred earlier</p> <p>^aSuspension of Moving On component: For PSH providers in the pilot, implementation of ‘Moving On’ was a component of the pilot with the primary aim to promote transition to independent living. Housing provider case managers were to conduct the Moving On Assessment, developed by the Corporation for Supportive Housing, at least once per year with clients if deemed appropriate, shortly before the client’s face-to-face meeting.</p>			

Report Aims

The aim of the report was to 1) describe available data on pilot fidelity and the implementation process and to 2) compare outcomes (6 and 12-month stable housing, 6-month viral load suppression (VLS), and 12-month durable viral suppression (DVS)) among persons living with HIV (PWH) who were enrolled in the pilot compared with PWH who were enrolled in traditional housing models.

Methods

Data Sources

NYC Department of Health and Mental Hygiene (Health Department) HIV Surveillance Registry

The HIV Surveillance Registry contains demographic (sex, race/ethnicity, age at diagnosis) and transmission risk information on all diagnoses of HIV reported in NYC, as well as comprehensive HIV-related laboratory reporting (including all CD4 count and viral load (VL) dates and results for individuals who have received HIV medical care in NYC). The Registry tracks vital status, including date of death and cause of death for NYC PWH. Vital status information is updated through regular matches with local and national death data to ascertain deaths occurring in and outside of NYC.⁸

HASAWeb data shared with the Health Department

The Health Department receives pilot datasets from HASA each quarter. The data arrive in the form of a “client” dataset with one record per person enrolled in the quarter, and an “address” dataset with one record per stay that a person who was enrolled in the quarter ever had at a residence in their entire history as a HASA client. Health Department Division of Disease Control staff from the Housing Services Unit and the HIV Epidemiology Program work collaboratively to match the HASA client dataset to the NYC HIV Surveillance Registry (eHARS) via a 36-key match algorithm, taking into account previous HASA-eHARS record linkages, and manually reviewing tentative matches to make a final determination. When each quarter’s match is finalized, new and updated results are appended to a HASA-eHARS master match file that also reflects ongoing QA-related changes to eHARS such as resolution of duplicate or merged cases. For these analyses, we used PSH and TSH enrollments reported from October 24, 2018, through August 31, 2022, and ESRO enrollments reported from May 28, 2019, to August 31, 2022.

Measures

Index Date

The date of pilot or non-pilot enrollment was the index date, or the point from which we measured outcomes. For the non-pilot arms, the index date was the earlier of the start of the pilot or enrollment in housing unit after the start of the pilot. Within a cohort (PSH, TSH, or ESRO), a person could have multiple index dates for reenrollment and for moving between pilot or nonpilot housing units.

Primary Outcome

VLS was defined as having the most recent available VL value <200 copies/mL in the 6-month period following date of enrollment. Individuals with no VL test in the Registry during the look-back period are considered unsuppressed, given these individuals are presumed to reside in NYC and should have regular viral load monitoring if they are accessing medical care.

Secondary Outcomes

Secondary outcomes of interest included durable viral suppression (DVS) and housing stability. Durable viral suppression was defined as all VL values <200 copies/mL from 3 to 12 months after enrollment (i.e., DVS='Yes'), allowing the first 3 months for someone to be linked to care. As a sensitivity analysis, we examined other DVS definitions: a) having the first and last VL <200 copies/mL in the observation period and b) having the last VL <200 and no VL ≥200, even if there was only one VL in the period.

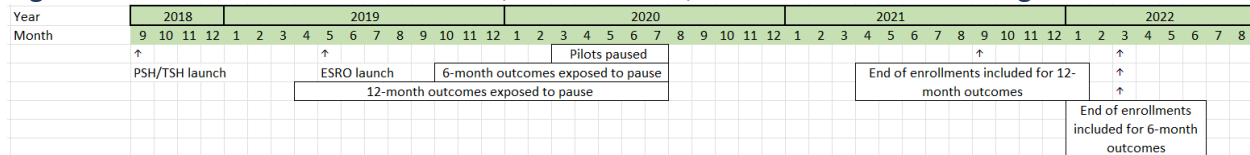
Housing stability was defined based on a range of HASA & other housing types classified as stable or not (see Supplemental Table 1 for examples) at 6 months and at 12 months after enrollment. We considered clients without an address or missing information to be unstably housed. We defined further subgroups of housing based on housing types as a) transitional or not, b) emergency housing (excluding transitional) or not, and c) unspecified or not (see Supplemental Table 1). Notably, the “unspecified” housing category can have a great deal of variability. Unspecified housing reflects a point-in-time measure and includes clients who did not sign in at an ESRO or TSH site for more than three days. Some of these clients may have had truly unstable housing during that time (such as living on the street), but many more temporarily stay with family, partners, or friends, without informing their caseworker. Other clients may be in a hospital or incarcerated.

COVID-19 Pause

The pilots were paused due to COVID-19 from March 20-July 6, 2020. Persons enrolled within 6 months of March 20 would have the short-term outcome (VLS) monitored during the pause, and persons enrolled within 12 months of March 20 would have the long-term outcome (DVS) monitored during the pause. For example, someone enrolled in January 2020, two months before the pause, would have VLS monitored through June 2020. For 6-month outcomes, we considered persons *unexposed* to the COVID pause if they enrolled before September 19, 2019

or after July 6, 2020, and enrollments between September 19, 2019 and July 6, 2020 were considered exposed. For 12-month outcomes, we considered persons to be unexposed to the COVID pause if they enrolled before March 22, 2019 or after July 6, 2020, and exposed if they enrolled within that time-frame. Figure 1 shows enrollment months where outcome follow-up was during the COVID-pause.

Figure 1. Timeline of Pilot Enrollments, COVID Pause, and Outcome Monitoring



Successful Visits

To summarize visits, we used *any in-person* visit (e.g., initial assessment, ongoing case maintenance, case conference, housing pilot, rent check delivery for new housing) by any HASA staff (e.g., caseworker, their supervisor, their director) during the period of assignment to the pilot. We restricted to successful visits because those would be expected to improve VLS or housing outcomes. However, the successful visit metric does not capture telephone calls, office visits, texts, or mailings that may have reached clients. Furthermore, data on attempted or unsuccessful visits were unavailable per the data sharing agreement. According to internal HASA data, approximately one-third of all visits are attempted visits that were unsuccessful due to client non-responsiveness (e.g., client not a home at time of scheduled home visit). “Successful visits” therefore does not reflect all caseworker contact efforts.

Covariates

We included some demographic and clinical variables as covariates: sex, race/ethnicity, age as of pilot enrollment, HIV transmission risk category, AIDS diagnosis as of pilot enrollment, baseline viral load, baseline CD4 and the number of laboratory events reported in the 6 months prior to enrollment. Baseline viral suppression was defined based on the last viral load test reported in the 6 months preceding the index date. Baseline CD4 count was defined based on the last CD4 count reported in the 6 months preceding the index date. We also examined the number of labs reported to the Registry in the year prior to the index date, as a proxy for engagement in HIV medical care.

Statistical Analysis

We merged HASA data, which detailed assignment to a pilot or non-pilot unit, with Registry data, which contained demographics and laboratory information to create three study cohorts: PSH, TSH and ESRO.

To describe pilot fidelity and implementation, we present summary statistics (frequencies and proportions) among all enrollments as of August 2022. To summarize visit frequency, the

number of successful in-person visits documented during enrollment was divided by the days of enrollment.

To assess the effectiveness of the pilot on outcomes, we used an intention to treat (ITT) approach. Thus, we did not restrict to a minimum duration of enrollment. We used enrollments through August 2021 or February 2022 for follow-up of 12 or 6 months, respectively. We used a log-binomial model or modified Poisson model with robust errors and generated risk ratios using the GENMOD procedure in SAS Version 9.4. We present models among enrollments *unexposed to the pause*. We used generalized estimating equations to address correlated standard errors, given individuals could be enrolled more than once. For all models, we included a missing indicator for CD4 or VL measured at pilot/non-pilot enrollment so that clients missing baseline CD4 or VL were not excluded from the models.

For the PSH and TSH pilots, the model included a group indicator (pilot or non-pilot) and adjusted for an a priori list of confounders: sex, race/ethnicity, age as of pilot enrollment, HIV transmission risk category, AIDS diagnosis as of pilot enrollment, baseline viral load, baseline CD4 and the number of labs reported in the year prior to enrollment. For the ESRO pilots, where clients were randomly selected, we present models adjusted by AIDS status as of enrollment, enrollment VL and enrollment CD4, as these covariates were descriptively different by pilot and non-pilot arm.

Enrollments

Table 4. Enrollment Numbers for Fidelity and Effectiveness Analyses

End of Follow-Up	PSH Clients		TSH Clients		ESRO Clients		
	Non-Pilot	Pilot	Non-Pilot	Pilot	Non-Pilot	Pilot	
August 2022							Fidelity
Total, N (Enrollments)	N = 5,947 (e=6,068)	N=412 (e=430)	N = 5,163 (e=6,787)	N = 1,177 (e=1,225)	N=6,529 (e=11,281)	N =536 (e=544)	
February 2022							6-month outcomes: VLS and stable housing
Total, N (Enrollments)	N=5,669 (e=5,765)	N=393 (e=410)	N=4,563 (e=5,884)	N=1,091 (e=1,134)	N=6,009 (e=10,028)	N=533 (e=539)	
Unexposed to Pause, N (Enrollments)	N=5,207 (e=5,297)	N=364 (e=380)	N=3,661 (e=4,610)	N=830 (e=868)	N=4,501 (e=7,107)	N=400 (e=405)	
August 2021							12-month DVS
Total, N (Enrollments)	N=5,457 (e=5,530)	N=391 (e=406)	N=4,007 (e=5,051)	N=977 (e=1,016)	N=5,624 (e=8,973)	N=474 (e=477)	
Unexposed to Pause, N (Enrollments)	N=4,717 (e=4,752)	N=326 (e=333)	N=2,614 (e=2,998)	N=554 (e=564)	N=1,735 (e=2,267)	N=103 (e=104)	
Target Enrollments	e=4,900	e=370	e=3,400	e=1,300	e=12,120	e=840	

Data through February 2022 used for 6-month outcomes (VLS and housing) and through August 2021 for 12-month outcomes (DVS).

Table 4 summarizes enrollments by unique number of clients (N) and number of enrollments (e) for different analyses. For example, as of August 2022, there were 412 PSH pilot clients with 430 enrollments in the PSH pilot. There were 380 PSH pilot enrollments *unexposed* to the COVID pause with 6 months follow-up before the pilots ended, and there were 333 PSH pilot enrollments *unexposed* to the COVID pause with 12 months of follow-up.

The target enrollment number was based on the a priori power calculation for the 6-month VLS outcome. Among the subgroups *unexposed* to the COVID pause, the PSH pilot met target enrollments for the pilot and non-pilot arms. The TSH pilot was slightly underenrolled for the pilot arm (868 enrollments versus 1,300 target) but exceeded enrollment for the non-pilot arm (4,610 enrollments versus 3,400 target). The ESRO pilot was underenrolled for the pilot arm (405 enrollments versus 840 target) and non-pilot arm (7,107 enrollments versus 12,120 target).

Fidelity and Implementation Results

Table 5. Number of Client Enrollments in the PSH and TSH Pilots from September 24, 2018 to August 31, 2022 and in the ESRO Pilot from May 28, 2019 to August 31, 2022

Pilot	Cumulatively Enrolled as of 08/31/2022	Enrolled as of 08/31/2022	Moved on ¹ as of 08/31/2022	Enrollment duration in days – All Enrolled (Mean/ Median)	Ever re-enrolled ² as of 08/31/2022
PSH Pilot	412	255	157	968/1,220	16
TSH Pilot	1,177	120	1,057	200/140	46
ESRO Pilot	536	118	418	390/275	8
¹ Moved on (no longer in pilot) as of point in time. ² Re-enrolled in the same pilot was defined as having more than one pilot assignment with at least one day between assignments.					

From September 2018 to August 2022:

- A cumulative total of 412 clients had enrolled in the **PSH pilot**, and 255 people were enrolled by the end of August 2022. On average clients were enrolled in the pilot for more than 2.5 years (mean: 968 days and median: 1,220 days).
- A cumulative total of 1,177 clients had enrolled in the **TSH pilot**, and 2,120 people were enrolled by the end of August 2022. On average clients were enrolled in the pilot for approximately six months (mean: 200 days and median: 140 days).
- From May 2018 to August 2022 a cumulative total of 536 clients had enrolled in the **ESRO pilot**, and 118 people were enrolled by the end of August 2022. On average clients were enrolled in the pilot for a little over a year (mean: 390 days and median: 275 days).
- Pilot caseload ratios were under the pre-specified thresholds and generally decreased over time. In June 2022, the caseload ratios were 37:1 for PSH, 18:1 for TSH and 27:1 for ESRO.

Table 6. Caseload Ratios Across Reporting Periods

Reporting period	9/21/2018	12/31/2019	3/31/2021	6/30/2021	9/30/2021	12/31/2021	6/30/2022	8/31/2022
PSH	45	44	38	39	38	36	37	36
TSH	22	21	19	20	17	14	18	17
Reporting Period	5/21/2019	12/31/2019	3/31/2021	6/30/2021	9/30/2021	12/31/2021	6/30/2022	8/31/2022
ESRO	25	23	20	23	20	24	27	24

During periods when staff left, the caseload was managed by the supervisor and the caseload ratio may have varied.

Table 7. Proportion of Pilot and Non-Pilot Clients with Healthix Consents

	Total Enrolled in Reporting Period	Healthix consented in reporting period (N, row %)		Healthix Declined in reporting period (N, row %)		Healthix Unknown (N, row %)	
PSH Non-Pilot	5,947	2,833	47.6%	1,018	17.1%	2,096	35.2%
PSH Pilot	412	344	83.5%	37	9.0%	31	7.5%
TSH Non-Pilot	5,163	2927	56.7%	835	16.2%	1,401	27.1%
TSH Pilot	1,177	810	68.8%	145	12.3%	222	18.9%
ESRO Non-Pilot	6,529	3,681	56.4%	1,034	15.8%	1814	27.8%
ESRO Pilot	536	393	73.3%	77	14.4%	65	12.1%

- The proportion of people with documented consents to Healthix was highest among the PSH pilot (84%), followed by the ESRO and TSH pilots (73% and 69%, respectively).
- In the non-pilot, the proportion of people with documented consents to Healthix ranged from 47% to 57%.
- The proportion of clients with documented consents was higher in the pilot than non-pilot arms, but the difference between pilot and non-pilot varied by type of housing. The greatest difference was in the PSH (84% pilot versus 48% non-pilot) and the smallest difference was in the TSH (69% pilot versus 57% non-pilot).
- A higher proportion of non-pilot clients (27-35%) had unknown Healthix consent than pilot clients (8%-19%).

Table 8. Average Visit Frequency by Housing and Pilot Status

	PSH		TSH		ESRO	
	Non-Pilot	Pilot	Non-Pilot	Pilot	Non-Pilot	Pilot
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Total	5947 (100.0)	412 (100.0)	5163 (100.0)	1177 (100.0)	6529 (100.0)	536 (100.0)
Every 30 Days	49 (0.8)	2 (0.5)	376 (7.3)	122 (10.4)	326 (5.0)	20 (3.7)
Every 90 Days	486 (8.2)	40 (9.7)	1343 (26.0)	492 (41.8)	1366 (20.9)	122 (22.8)
Every 183 Days	1777 (29.9)	67 (16.3)	702 (13.6)	154 (13.1)	1208 (18.5)	112 (20.9)
Every 365 Days	2075 (34.9)	184 (44.7)	313 (6.1)	47 (4.0)	886 (13.6)	82 (15.3)
Every >365 Days	939 (15.8)	90 (21.8)	114 (2.2)	7 (0.6)	528 (8.1)	47 (8.8)
No Visits	621 (10.4)	29 (7.0)	2315 (44.8)	355 (30.2)	2215 (33.9)	153 (28.5)
To estimate visit frequency, the number of visits documented during enrollment was divided by the total days enrolled.						
N=the number of clients receiving that level of visit frequency						
'Visits' included any documented visit type						
Shaded rows indicated expected frequency						

- Specific to the PSH pilot, bi-annual meetings with the client that included the HASA caseworker and other support staff (i.e., client's supportive housing caseworker, etc.) were required. For this pilot, wellness checks were only required every quarter that a HASA caseworker did not make a home visit.
 - Approximately 80% of Pilot PSH, did **not** have a documented wellness check.
 - Data shows that 10%, 16% and 45% of enrollees in the PSH pilot had a successful in-person visit documented in HASAWeb every 90 days, 183 days, and 365 days,

respectively. In the non-pilot PSH, 8%, 30% and 35% of clients had a successful in-person visit documented in HASAWeb every 90 days, 183 days, and 365 days, respectively.

- Thus, 26% of pilot clients and 38% of non-pilot clients had a successful visit semi-annually or more frequently.
- In the progress report summarizing visit frequency through March 2020, 63% of pilot clients and 74% of non-pilot clients had a successful visit semi-annually or more frequently. Visit frequency declined in later years of implementation for the PSH pilot and non-pilot arms.
- Specific to the TSH pilot, monthly face-to-face client home visits that included the HASA caseworker and other support staff (i.e., client's supportive housing caseworker, etc.) were required.
 - Data shows that 10%, 42% and 13% of enrollees in the TSH pilot had a successful visit documented in HASAWeb every 30 days, 90 days, and 183 days, respectively. In the non-pilot TSH, 7%, 26%, 14% of clients in non-pilot TSH had a successful visit documented in HASAWeb every 30 days, 90 days, and 183 days, respectively.
 - Thus, 52% of pilot clients and 33% of non-pilot clients had a successful visit at least every 90 days.
 - In the progress report summarizing visit frequency through March 2020, 78% of pilot clients and 51% of non-pilot clients had a successful visit at least every 90 days. TSH pilot and non-pilot visit frequency declined in later years of implementation.
- Specific to the ESRO pilot, monthly face-to-face client home visits by the HASA caseworker that included the clients' ICP team were required, in addition to completion of an initial home visit assessment.
 - More than half of ESRO pilot clients (n = 309, 58%) had an initial home visit assessment completed. The proportion of ESRO pilot clients with an initial home visit as of August 2022 declined relative to March 2020 where 67% had an initial home visit assessment.
 - Data shows that 4%, 23%, and 21% of ESRO pilot enrollees had a successful visit documented in HASAWeb every 30 days, 90 days, and 183 days, respectively. In the non-pilot ESRO, 5%, 21%, and 19% of clients had a visit documented in HASAWeb every 30 days, 90 days, and 183 days, respectively.
 - Thus, 27% of pilot clients and 26% of non-pilot clients had successful a visit at least every 90 days.
 - In the progress report summarizing visit frequency through March 2020, 54% of pilot clients and 49% of non-pilot clients had a visit at least every 90 days. ESRO pilot and non-pilot visit frequency declined in later years of implementation.

Effectiveness Results

Characteristics of Pilot versus Non-Pilot Clients

Table 9. Characteristics of PSH Pilot versus Non-Pilot Clients Enrolled from September 24, 2018 to February 28, 2022

	PSH Pilot				P-Value^
	No		Yes		
	N	%	N	%	
Total Unique Clients	5,669	100	393	100	
Gender					0.94
Male	4,156	73.31	285	72.52	
Female	1,313	23.16	94	23.92	
Transgender people	200	3.53	14	3.56	
Race/Ethnicity					0.40
Black	3,341	58.93	223	56.74	
Hispanic	1,478	26.07	102	25.95	
White	547	9.65	50	12.72	
Asian/Pacific Islander	26	0.46	2	0.51	
Multiracial	89	1.57	7	1.78	
Other/Unknown	188	3.32	9	2.29	
Risk					0.23
Men who have sex with men	2,028	35.77	136	34.61	
Injection drug use history	1,699	29.97	114	29.01	
Heterosexual contact	1,076	18.98	92	23.41	
Transgender people with sexual contact	199	3.51	15	3.82	
Other/unknown	667	11.77	36	9.16	
Diagnosis Year					0.20
Median (P25-P75)	2000 (1995-2007)		2000 (1994-2007)		
Number of Enrollments					<0.01
1	5,579	98.41	378	96.18	
2 or more	90	1.59	15	3.82	
Sum (Total Enrollments)	5,765		410		
Characteristics at Most Recent Enrollment					
Age					0.82
Median (P25-P75)	53 (43-60)		54 (41-60)		
AIDS	1,879	33.15	133	33.84	0.78
No	3,790	66.85	260	66.16	
Yes	1,879	33.15	133	33.84	
VLS					0.19
Yes (<200)	4,088	72.11	300	76.34	
No (≥200)	1,068	18.84	64	16.28	
Missing	513	9.05	29	7.38	
CD4					0.31
Median (P25-P75)	515 (313-763)		530 (304-813)		
Number of Laboratory Events					0.39
Median (P25-P75)	2 (1-2)		2 (1-2)		
Enrollment Duration (days)					
Median (P25-P75)	1,281 (600-1,437)		1,222 (488-1,440)		<.0001
Enrollment Relative to COVID Pause*					
Pre-Pause (Unexposed)	4,416	77.9	342	87.02	<.0001
During Pause (Exposed to Pause)	462	8.15	29	7.38	
Post Pause (Unexposed)	791	13.95	22	5.6	
*For a 6-month outcome, enrollments from September 19-March 20, 2020 would have outcomes monitored 'During Pause'					
^P-value for Chi-Square test for proportions or Wilcoxon Mann-Whitnev test for continuous variables.					

The PSH cohort included a total of 6,062 clients (5,669 non-pilot clients and 393 pilot clients). One hundred and five clients (1.7% of total PSH enrollments) enrolled more than once (90 in non-pilot and 15 in pilot). We present characteristics at most recent enrollment for laboratory variables that could change at each enrollment. Supplemental Table 2 details characteristics that varied at each enrollment.

The pilot and non-pilot arms were similar in terms of demographics, HIV transmission risk category, AIDS status, baseline VLS and baseline CD4, and number of laboratory events reported in the 6 months prior to enrollment (Table 9). Among pilot enrollees, the majority were male (73%) and 57% were black non-Hispanic, 26% were Hispanic, and 13% were white non-Hispanic. By HIV transmission risk category, 35% were men who have sex with men (MSM), 29% had a history of injection drug use (IDU), and 23% had heterosexual contact. The median age at each enrollment into the pilot was 54 years. Most pilot enrollees had baseline VLS (76%) and a median CD4 of 530 cells/mm³ (interquartile range (IQR): (304, 813)). Pilot enrollees had a shorter enrollment in PSH than non-pilot enrollees: (median enrollment days (IQR): 1,222 versus 1,281 in non-pilot). The proportion of PSH clients exposed to the COVID pause was similar in the pilot and non-pilot (7-8%). However, fewer pilot clients enrolled post pause than non-pilot clients (6% versus 14%).

Table 10. Characteristics of TSH Pilot versus Non-Pilot Clients Enrolled from September 24, 2018 to February 28, 2022

	TSH Pilot				P-Value^
	No		Yes		
	N	%	N	%	
Total Unique Clients	4,563	100	1,091	100	
Gender					<.0001
Male	3,614	79.20	744	68.19	
Female	532	11.66	247	22.64	
Transgender people	417	9.14	100	9.17	
Race/Ethnicity					<0.01
Black	2,582	56.59	645	59.12	
Hispanic	1,199	26.28	298	27.31	
White	476	10.43	71	6.51	
Asian/Pacific Islander	40	0.88	9	0.82	
Multiracial	90	1.97	14	1.28	
Other/Unknown	176	3.86	54	4.95	
Risk					<.0001
Men who have sex with men	2,222	48.70	466	42.71	
Injection drug use history	935	20.49	213	19.52	
Heterosexual contact	578	12.67	202	18.52	
Transgender people with sexual contact	376	8.24	99	9.07	
Other/unknown	452	9.91	111	10.17	
Diagnosis Year					0.02
Median (P25-P75)	2009 (2001-2015)		2008 (2000-2015)		
Number of Enrollments					<.0001
1	3,645	79.88	1,049	96.15	
2 or more	918	20.12	42	3.85	
Sum (Total Enrollments)	5,884		1,134		
Characteristics at Most Recent Enrollment					
Age					<0.01
Median (P25-P75)	39 (31-52)		42 (32-54)		
AIDS					0.24
No	2,461	53.93	567	51.97	
Yes	2,102	46.07	524	48.03	
VLS					<.0001
Yes (<200)	2,212	48.48	637	58.39	
No (≥200)	1,266	27.74	318	29.15	
Missing	1,085	23.78	136	12.47	
CD4					0.08
Median (P25-P75)	483 (259-718)		501 (292-732)		
Number of Laboratory Events					<.0001
Median (P25-P75)	1 (1-2)		2 (1-3)		
Enrollment Duration (days)					<.0001
Median (P25-P75)	100 (34-217)		142 (77-262)		
Enrollment Relative to COVID Pause*					<.0001
Pre-Pause (Unexposed)	1,567	34.34	492	45.1	
During Pause (Exposed to Pause)	902	19.77	261	23.92	
Post Pause (Unexposed)	2,094	45.89	338	30.98	
*For a 6-month outcome, enrollments from September 19-March 20, 2020 would have outcomes monitored ‘During Pause’					
^P-value for Chi-Square test for proportions or Wilcoxon Mann-Whitney test for continuous variables.					

The TSH cohort included a total of 5,654 clients (4,563 non-pilot clients and 1,091 pilot clients). 960 people (17% of total TSH enrollments) enrolled more than once (918 in non-pilot and 42 in pilot).

Among pilot enrollees, the majority were male (68%), 59% were black non-Hispanic, 27% were Hispanic, and 7% were white non-Hispanic. Pilot enrollees were slightly older (median 42 years versus 39 years at enrollment), more female (23% versus 12%), and more likely to have a heterosexual (19% versus 13%) transmission risk category than non-pilot enrollees. The pilot enrollees had a higher proportion with baseline VLS and a slightly higher baseline CD4 counts than non-pilot enrollees (VLS: 58% in pilot versus 49% in non-pilot and median CD4 (interquartile range (IQR)): 501 cells/mm³ (292, 732) in pilot and 483 cells/mm³ (259, 718) in non-pilot). Pilot enrollees were enrolled longer than non-pilot enrollees: (median enrollment days (IQR): 142 (77, 262) in pilot and 100 (34, 217) in non-pilot). Fewer pilot clients had their most recent enrollment post pause than non-pilot clients (31% versus 46%).

Table 11. Characteristics of ESRO Pilot versus Non-Pilot Clients Enrolled from May 28, 2019 to February 28, 2022

	ESRO Pilot				P-Value^
	No		Yes		
	N	%	N	%	
Total Unique Clients	6,009	100	533	100	
Gender					0.16
Male	4,763	79.26	426	79.92	
Female	793	13.20	78	14.63	
Transgender people	453	7.54	29	5.44	
Race/Ethnicity					0.28
Black	3,653	60.79	326	61.16	
Hispanic	1,435	23.88	139	26.08	
White	556	9.25	46	8.63	
Asian/Pacific Islander	23	0.38	1	0.19	
Multiracial	106	1.76	10	1.88	
Other/Unknown	236	3.93	11	2.06	
Risk					0.09
Men who have sex with men	2,654	44.17	211	39.59	
Injection drug use history	1,474	24.53	153	28.71	
Heterosexual contact	856	14.25	86	16.14	
Transgender people with sexual contact	411	6.84	30	5.63	
Other/unknown	614	10.22	53	9.94	
Diagnosis Year					<0.01
Median (P25-P75)	2007 (1999-2013)		2005 (1998-2012)		
Number of Enrollments					<.0001
1	3,937	65.52	527	98.87	
2 or more	2,072	34.48	6	1.13	
Sum (Total Enrollments)	10,028		539		
Characteristics at Each Enrollment					
Age					<0.001
Median (P25-P75)	42 (32-54)		46 (34-56)		
AIDS					0.02
No	2,881	47.94	228	42.78	
Yes	3,128	52.06	305	57.22	
Baseline VL					0.36
Yes (<200)	2,750	45.76	254	47.65	
No (≥200)	1,880	31.29	171	32.08	
Missing	1,379	22.95	108	20.26	
Baseline CD4					0.42
Median (P25-P75)	451 (235-698)		433 (213-722)		
Baseline Number of Laboratory Events					0.35
Median (P25-P75)	1 (1-2)		2 (1-2)		
Enrollment Duration (days)					<.0001
Median (P25-P75)	186 (66-416)		274 (155-491)		
Enrollment Relative to COVID Pause*					<.0001
Pre-Pause (Unexposed)	2,162	35.98	237	44.47	
During Pause (Exposed to Pause)	1,508	25.1	133	24.95	

Post Pause (Unexposed)	2,339	38.92	163	30.58	
*For a 6-month outcome, enrollments from September 19-March 20, 2020 would have outcomes monitored 'During Pause'					
^P-value for Chi-Square test for proportions or Wilcoxon Mann-Whitney test for continuous variables.					

The ESRO cohort included a total of 6,542 enrollments (6,009 non-pilot enrollments and 533 pilot enrollments). As expected, given random selection for the pilot, the pilot and non-pilot arms were generally similar in terms of demographics (Table 11). Among pilot clients, the majority were male (80%), and 61% were non-Hispanic Black, 26% were Hispanic, and 9% were non-Hispanic White. However, some differences existed between pilot and non-pilot with respect to diagnosis year and AIDS as of most recent enrollment. The pilot enrollees were older (median 46 versus 42) and had a higher proportion with an AIDS diagnosis (AIDS at enrollment: 57% versus 52%). Pilot enrollees were enrolled for longer than non-pilot enrollees: (median enrollment days (IQR):274 (155, 491) in pilot and 100 (34, 217) in non-pilot). The proportion of ESRO clients *exposed* to the COVID pause was similar among pilot and non-pilot enrollees (25%). However, fewer pilot clients enrolled post pause (31% versus 39%).

Impact on Viral Load Suppression and Durable Viral Suppression

Table 12. Pilot Impact on 6-Month Viral Load Suppression – Enrollments through February 28, 2022

	Non-Pilot			Pilot			Pilot vs Non-Pilot	
	Denominator	VLS		Denominator	VLS		Unadjusted RR (95% CI)	Adjusted RR (95% CI)
	N (Col %)	N	Row %	N (Col %)	N	Row %		
PSH - All Enrollments	5,765 (100.00)	4,146	71.92	410 (100.00)	310	75.61	1.05 (0.99, 1.11)	1.02 (0.97, 1.06)
Unexposed to pause	5,297 (91.88)	3,835	72.40	380 (92.68)	293	77.11	1.06 (1.01, 1.13)	1.03 (0.99, 1.07)
TSH - All Enrollments	5,884 (100.00)	3,216	54.66	1,134 (100.00)	711	62.70	1.15 (1.09, 1.21)	1.06 (1.02, 1.11)
Unexposed to pause	4,610 (78.35)	2,582	56.01	868 (76.54)	563	64.86	1.16 (1.10, 1.22)	1.06 (1.01, 1.11)
ESRO - All Enrollments	10,028 (100.00)	4,488	44.75	539 (100.00)	259	48.05	1.07 (0.98, 1.17)	1.06 (0.98, 1.14)
Unexposed to pause	7,107 (70.87)	3,263	45.91	405 (75.14)	202	49.88	1.09 (0.98, 1.20)	1.08 (0.99, 1.17)
Unexposed: 6-month outcome follow-up is not during pause for enrollments before Sept 20, 2019 or enrollments after July 31, 2020.								
PSH and TSH clients were not randomly selected, and the models adjust for baseline VLS, aids at enrollment, transmission risk, age, gender, race, number of laboratory events at enrollment and year of diagnosis								
ESRO clients were randomly selected, and the model adjusts for AIDS, enrollment VL, and enrollment CD4. These variables were chosen as appeared unbalanced after randomization								

Among clients who were *unexposed* to the COVID pause, the proportion of enrollees with VLS was a little higher among pilot enrollees than non-pilot enrollees. The pilot impact on aRR of VLS was 1.03 among PSH enrollees (76% versus 72%, [95% CI: 0.99-1.07]), was 1.06 among TSH pilot enrollees (65% versus 56%, [95% CI: 1.01-1.11]), and 1.06 among ESRO enrollees (50% versus 46%, [95% CI: 0.98-1.14]).

Viral Suppression by Duration and Timing of Enrollment

Supplemental Table 3 display VLS by housing type and duration of enrollment among those unexposed to the COVID pause. In PSH most enrollments lasted at least 180 days (88% of pilot and 94% of non-pilot enrollments lasting 180+ days). In TSH and ESRO, pilot enrollments were more likely than non-pilot enrollments to last for 180+ days (TSH: 40% of pilot versus 25% of non-pilot enrollments and ESRO: 68% of pilot versus 40% of non-pilot enrollments).

In PSH and TSH housing types, viral suppression was higher among those enrolled for 180+ days versus less than 180 days (p for trend PSH: 0.033 and TSH=0.003). However, in ESRO pilot and non-pilot arms, viral suppression was similar by duration of enrollment (p for trend 0.668).

The proportion with VLS varied by housing type and timing of enrollment. VLS was highest among PSH enrollees and lowest among ESRO enrollees. VLS decreased from before to during the COVID pause. After the COVID pause VLS increased; however, VLS remained lower than before the COVID pause (Supplemental Table 4).

Table 13. Pilot Impact on Durable Viral Load Suppression (DVS) from 3-12 Months Post Enrollment - Among Clients Unexposed to Pause and Enrolled as of August 2021

	Non-Pilot			Pilot			Pilot vs Non-Pilot	
	Denominator	VLS		Denominator	VLS		Unadjusted RR (95% CI)	Adjusted RR (95% CI)
	N (Col %)	N	%	N (Col %)	N	%		
All VL from 3-12 months post enrollment were <200								
PSH	4,752	2,966	62.42	333	234	70.27	1.10 (1.02, 1.18)	1.05 (0.98, 1.11)*
TSH	2,998	1,220	40.69	564	287	50.89	1.17 (1.08, 1.28)	1.13 (1.05, 1.22)*
ESRO	2,267	665	29.33	104	38	36.54	1.24 (0.97, 1.59)	1.11 (0.88, 1.39)
First and last VL from 3-12 months post enrollment was <200								
PSH	4,752	3,124	65.74	333	246	73.87	1.10 (1.03, 1.17)	1.05 (0.99, 1.11)*
TSH	2,998	1,323	44.13	564	305	54.08	1.15 (1.06, 1.25)	1.11 (1.03, 1.19)*
ESRO	2,267	746	32.91	104	39	37.50	1.14 (0.89, 1.44)	1.02 (0.82, 1.27)
Includes enrollments before March 22, 2019 and includes enrollments from July 31, 2020. These clients were unexposed to the COVID pause and 12-month outcome follow-up is not during the COVID pause. No ESRO cases were enrolled before March 22, 2019. The number unexposed is lower for an outcome monitored through 12 months than an outcome monitored through 6 months because more people have follow-up (through 12 months) that occurs during the COVID pause								
PSH and TSH adjusted for baseline VLS, aids at enrollment, transmission risk, age, gender, race, number of laboratory events at enrollment and year of diagnosis								
ESRO adjusted for AIDS, enrollment VL, and enrollment CD4. Variables chosen as appeared unbalanced after randomization								
*Poisson with robust errors								

Among TSH clients who were *unexposed* to the COVID pause, the proportion of enrollments with DVS (defined as all VL from 3 to 12 months post-enrollment being less than 200) was higher among pilot versus non-pilot enrollments (51% versus 41%, aRR: 1.13 [1.05-1.22]) (Table 13). Among PSH unexposed clients, DVS was higher among pilot than non-pilot enrollments (70% versus 62%, aRR 1.05 (0.98-1.11). Among ESRO clients who were *unexposed* to the COVID pause, DVS was higher among pilot versus non-pilot enrollments (37% versus 31%). However,

the confidence interval was wide (aRR:1.11; 0.88-1.39). Notably, the pilot sample size was quite small and included 104 pilot enrollments that were not exposed to the COVID pause. This is because the ESRO pilot launched in May 2019, and no one was enrolled and had more than 12 months of follow-up before the pause in March 2020.

Results were similar when changing the definition of DVS (the first and last VL from 3 to 12 months post-enrollment was less than 200; Table 13)

Impact on Stable Housing and Other Housing Types

Table 14. Pilot Impact on Housing Types: Stable, Transitional, Emergency (non-Transitional), or Unspecified Types at 12 Months– Among Clients Unexposed to Pause and Enrolled as of February 28, 2022

	Non-Pilot			Pilot			Pilot vs Non-Pilot Effect on Enrollment in Housing Type at 6 Months	
	Denominator	Housing Type		Denominator	Housing Type		Unadjusted RR (95% CI)	Adjusted RR (95% CI)
	N	N	%	N	N	%		
PSH – Unexposed to Pause								
Stable Housing	5,297	5,078	95.87	380	362	95.26	0.99 (0.97, 1.02)	0.99 (0.97, 1.01)*
Transitional Housing	5,297	14	0.26	380	1	0.26	1.00 (0.13, 7.55)	*
Emergency Housing^	5,297	45	0.85	380	1	0.26	0.31 (0.04, 2.24)	0.33 (0.05, 2.41)
Unspecified Housing	5,297	160	3.02	380	16	4.21	1.39 (0.84, 2.30)	1.51 (0.91, 2.49)
TSH – Unexposed to Pause								
Stable Housing	4,610	1,007	21.84	868	202	23.27	1.07 (0.93, 1.22)	1.04 (0.91, 1.18)
Transitional Housing	4,610	1,375	29.83	868	395	45.51	1.53 (1.40, 1.66)	1.89 (1.63, 2.20)
Emergency Housing^	4,610	1,031	22.36	868	116	13.36	0.60 (0.50, 0.72)	0.63 (0.53, 0.76)
Unspecified Housing	4,610	1,197	25.97	868	155	17.86	0.69 (0.59, 0.80)	0.72 (0.62, 0.83)
ESRO – Unexposed to Pause								
Stable Housing	7,107	944	13.28	405	40	9.88	0.74 (0.55, 1.00)	0.74 (0.55, 1.00)
Transitional Housing	7,107	511	7.19	405	8	1.98	0.27 (0.14, 0.55)	0.28 (0.14, 0.55)
Emergency Housing^	7,107	3,960	55.72	405	306	75.56	1.36 (1.28, 1.44)	1.35 (1.27, 1.43)
Unspecified Housing	7,107	1,692	23.81	405	51	12.59	0.53 (0.41, 0.69)	0.53 (0.41, 0.69)
*Poisson model								
**Model did not converge. Too few observations.								
^Emergency housing, excluding transitional								
Unexposed: 6-month outcome follow-up is not during pause for enrollments before Sept 20, 2019 or enrollments after July 31, 2020.								
PSH clients were not randomly selected, and the models adjust for baseline VLS, aids at enrollment, transmission risk, age, gender, race, number of laboratory events at enrollment and year of diagnosis								
TSH clients were not randomly selected, and the models adjust for baseline VLS, aids at enrollment, transmission risk, age, gender, race, number of laboratory events at enrollment and year of diagnosis								
ESRO clients were randomly selected, and the model adjusts for AIDS, enrollment VL, and enrollment CD4. These variables were chosen as appeared unbalanced after randomization								

Among clients who were *unexposed* to the COVID pause, the proportion of PSH pilot enrollments who maintained or moved onto independent living was similar between the pilot and non-pilot arms (95% versus 96%, aRR: 0.99 [0.97-1.01]) (Table 14). As most PSH clients

were enrolled in PSH housing, the likelihood of moving onto other types of housing (transitional, emergency excluding transitional, or unspecified) was low and did not differ between the two groups.

The proportion of TSH pilot versus non-pilot enrollments who had moved onto stable housing at 6 months was similar (23% versus 22%, aRR: 1.04 [0.91-1.18]). The proportion who had maintained transitional housing was higher in the pilot than non-pilot (aRR: 1.89 [1.63-2.20]). TSH pilot enrollments were less likely than non-pilot enrollments to have moved onto emergency housing, excluding transitional (aRR: 0.63 [0.53-0.76]).

The proportion of ESRO pilot enrollments who have moved onto stable housing at 6-months was lower than ESRO non-pilot enrollments (stable: 10% versus 13%, aRR: 0.65 [0.49-0.87]) (Table 12). Few ESRO pilot enrollments moved onto transitional housing (2%) at 6 months. ESRO pilot enrollments were more likely to be in emergency housing, excluding transitional than non-pilot enrollments (aRR: 1.35 [1.27, 1.43]).

TSH and ESRO pilot enrollments were less likely to have unspecified housing than non-pilot enrollments.

The pilot impact on 12-month housing outcomes (Supplemental Table 5) was generally similar to the impact on 6-month housing outcomes.

Discussion

Over three years of implementation, the HASA demonstration pilots aimed to maintain VLS and stable housing in the PSH pilot and improve VLS and stable housing in the TSH and ESRO pilots. The impact of the PSH and TSH pilots on VLS and on DVS was aligned with the goals of the pilots and increased VLS and DVS among TSH clients without worsening outcomes among PSH clients. Among clients randomly selected for the ESRO pilot, VLS was slightly higher than among clients in the non-pilot ESRO, which aligned with the goals of the ESRO pilot. The ESRO pilot impact on DVS was positive but with wide 95% confidence, indicating a range of possible true effects of the pilot, from reducing to increasing DVS, and including the possibility of no effect. The pilots were paused for 3 months at the start of the COVID-19 pandemic, which impacted sample sizes and HRA activities, which were redirected to address health and safety pertaining to the COVID-19 pandemic.

The impact of the pilots on VLS and DVS should be interpreted alongside implementation process measures. A positive aspect of pilot implementation is that both pilot and non-pilot clients enrolled in Healthix, which is intended to improve communication of demographic and laboratory information between providers. Healthix enrollment was higher in the pilot than non-pilot arms and enrollment into Healthix has continued after pilot completion. Notably, more than 90% of NYC HASA clients had health insurance (primarily Medicaid, according to internal data) which ensures healthcare insurance is not a barrier to acting on Healthix laboratory information that suggests care re-engagement is needed.

With respect to the PSH and TSH pilot, two important implementation measures to consider were successful in-person visits and caseload ratios. Arguably, successful visits matter for improving the outcomes of VLS, DVS and stable housing, and notably, some successful visits were not captured, such as phone calls, emails, or office visits. Attempted visits would have been a better marker for pilot fidelity; however, this information was not available. As part of the core elements for the PSH pilot, HASA caseworkers were to conduct a bi-annual meeting with the client and the client's care team. The lower proportion of successful visits among pilot clients relative to non-pilot clients was expected given the higher pre-specified caseload ratio in the pilot relative to non-pilot, the requirement for less frequent visits in the pilot relative to non-pilot, and the presumption that these clients required a less intensive touch from HASA caseworkers to maintain current levels of viral suppression. As of June 2022, the PSH pilot caseload ratios (37:1) were lower than the pre-specified thresholds and lower than the mandated caseload ratio in the non-pilot arm. In December 2021 the PSH caseload ratio was 44:1; thus, the PSH caseload ratio remained under the pre-specified threshold and declined over time. Further increasing the caseload ratio may change the effect of the PSH pilot model on VLS or DVS. As part of the core elements of the TSH pilot, HASA caseworkers were to conduct monthly face-to-face home visits that include the client's care team. The frequency of successful visits every 90 days in the TSH pilot arm was higher than in the non-pilot arm, and as expected, caseload ratios were lower in the pilot relative to non-pilot. However, in the TSH pilot, the caseload ratio as of June 2022 (18:1) was lower-than-expected and declined since the start of the pilot. The lower-than-expected caseload ratio may have contributed to positive findings on VLS or DVS.

As part of the core elements to the ESRO pilot, caseworkers were to conduct an initial home visit assessment shortly after client enrollment and complete the Joint Initial Home Visits to Single ESRO form. This assessment would be used to document outcomes of initial home visit, to establish Healthix consent, and to help create an integrated care planning (ICP) team. More than half of enrollees had this assessment completed. Clients in the ESRO pilot were also to receive monthly face-to-face visits (or more frequently, as needed) that included the ICP team. Despite lower caseload ratios in the pilot relative to non-pilot, the frequency of successful visits every 90 days was similar between pilot and non-pilot arms. Notably, the ESRO pilot was underenrolled and included less than half of the target number of enrollments in the pilot arm. The small sample in the ESRO pilot likely limited statistical power, and the similar frequency of successful visits in the ESRO pilot relative to non-pilot arm may have reduced pilot impact. These components could have contributed to the wide confidence interval in the relative risk of DVS, and the lack of evidence against the null hypothesis of zero difference in DVS between the pilot and non-pilot arms.⁹⁻¹¹

From March 2020, HRA concurrently worked with ESRO, TSRO, and PSH housing providers on COVID-related activities. Given the public health risk due to COVID-19, HRA and housing vendor staff efforts were often redirected to address health and safety issues pertaining to COVID-19. From September 2020 through December 2023, HRA in partnership with Housing Works, ran a COVID-19 testing and vaccination campaign across over 200 HRA congregate housing facilities.

Through this initiative, HRA administered more than 19,000 COVID-19 tests and 7,000 COVID-19 vaccines to clients and staff. Over 900 seasonal influenza vaccines were also administered through this partnership. The initiative included outreach, linkage to care, and rehousing. Clients identified to be COVID-positive and who met the criteria for isolation were offered relocation to minimize the spread of COVID within a congregate setting. The COVID-19 pandemic undoubtedly impacted the pilot. We restricted analyses to those individuals who would not have been exposed to the pause of the pilot. However, the broader impact of the COVID-19 on the pilot due to evolving HRA priorities and COVID-19 related efforts was difficult to assess. The COVID pandemic was likely a key reason for the lower-than-expected successful visit frequencies, the decline in visit frequency in later years of implementation in the PSH and TSH pilot, and the lower-than expected caseload ratios. While the pilots were only paused for three months, HASA and CBO staffing remained limited throughout the remainder of the analysis period, into 2022. The pandemic also had a substantial impact on clients' access to health care, ability to travel, and social isolation that could have impacted their ability to engage with HASA and housing provider staff. The pandemic may also have had some role in the ESRO and TSH pilot underenrollment. Notably, the total ESRO caseload is currently much lower than it was during initial pilot implementation, and this decline may have started during the pilot period.

In interpreting successful visit trends, it is important to again emphasize that unsuccessful visits or visit attempts were not captured. Per internal data, unsuccessful visits typically account for about one-third of all visits. Many clients have busy and complex lives, and some experience substance use and/or mental health concerns. Clients may not be home for scheduled visits; may be hard to reach because they do not have a phone or frequently change cell phones; or may unexpectedly enter a hospital, substance use rehabilitation services, or be incarcerated. Moreover, other types of interactions, such as phone calls and office visits, were not captured in the successful visit measure. It is possible that these interactions increased while in-person visits decreased, and that caseworker efforts remained high.

With respect to the stable housing outcome, results were mixed. An unintended consequence of the TSH and ESRO pilots was the increased enrollment duration relative to non-pilot arms. Thus, TSH pilot enrollments were more likely to be enrolled in transitional housing at 6 and at 12 months, and ESRO pilot enrollments were more likely to be enrolled in emergency non-transitional housing at 6 and at 12 months. In the case of the ESRO pilot, the median enrollment duration was more than double the non-pilot enrollment duration. The finding of lower stable housing among ESRO pilot clients is directly due to the increased enrollment duration since ESRO housing is classified as unstable. Notably, the increased enrollment duration in TSH or ESRO housing did not negatively impact VLS.

Unspecified housing was less likely in the TSH and ESRO pilots. However, the “unspecified” housing category is very broad and includes clients who did not sign in at ESRO or TSH for more than three days. Some of these clients may have had unstable housing during that time (such as living on the street), but more likely, these clients had temporarily stayed with family or friends,

or are in the hospital, without informing their caseworker. Based on HASA caseworker experiences, we believe that homelessness was likely rare for enrollees with unspecified housing, as alternate emergency housing would be an option, and an emergency housing option would be preferred over a NYC Department of Homeless Services (DHS) shelter. Moreover, the duration of time clients were not in their HASA housing could also vary considerably- anywhere from four days to months. It is therefore difficult to clearly interpret the “unspecified” housing outcome.

Findings were limited to what was documented in HASAWeb. Thus, successful caseworker visits could be underestimated if the information was not documented in HASAWeb. We focused on successful visits as these would be expected to impact outcomes; however, attempted visits, which were unavailable, may be the better measure of model fidelity. As with all observational studies, the PSH and TSH cohort results are subject to confounding. For instance, if fewer clients with barriers to treatment, such as substance use issues, were enrolled into the TSH pilot, the results may overestimate the pilot effect on VLS or DVS. Strengths of this analysis included the focus on the intention-to-treat estimate, which would result in underestimating any pilot effect, and the random selection for the ESRO pilot.

Conclusions

The core elements of these pilots were related to 1) changes in caseload ratios, 2) housing specific assignment, and 3) HASA and housing providers prioritizing viral suppression and health promotion at routine client visits. These changes were implemented for select clients living in PSH, TSH, and ESRO units. In the full HASA caseload, these three housing types account for approximately one-quarter of HASA households. As hypothesized, the PSH pilot did not worsen VLS or DVS, and the TSH pilot may have improved VLS and DVS. However, the PSH and TSH pilot caseload ratios were lower than expected, and further increasing the caseload ratio may change the effect of the model on VLS and DVS. In the ESRO pilot, caseloads were generally maintained at the correct threshold. However, the ESRO pilot was underenrolled with less than half of the target number of enrollments in the pilot arm. The ESRO pilot may have had a positive impact on VLS, but the interpretation of the pilot impact on DVS is less clear due to the wide confidence interval.

Supplemental Tables

Supplemental Table 1. HASA Housing Type Classification for Stable Housing

Address Type	Address Sub type	Stable Housing at 6 and 12 months	Housing Hierarchy at 6 and 12 months
Emergency Housing	MOU Family	Unstable	Emergency Housing Excluding Transitional
Emergency Housing	MOU Single		
Emergency Housing	DHS Shelters		
Emergency Housing	Non HRA Shelters		
Emergency Housing	Transitional Single Room Occupancy		Transitional
Independent Living	Apartment - Private	Stable	Stable
Independent Living	House - Private		
Independent Living	NYCHA		
Institutional Program	Drug Treatment		
Institutional Program	Health Related Facility (HRF)		
Institutional Program	Hospital		

Institutional Program	Skilled Nursing Facility (SNF)		
Permanent Supportive Housing	Apartment - Congregate		
Permanent Supportive Housing	Apartment - Scatter Site		
Permanent Supportive Housing	Non-contracted Supportive Housing		
Permanent Supportive Housing	NYNY III Congregate / Scatter Site		
Undomiciled	Undomiciled	Unstable	Unsheltered/Unspecified
Diligent Search	Diligent Search		
Missing			

Supplemental Table 2. Time-Varying Characteristics of Pilot versus Non-Pilot Clients at each Enrollment by Housing Category - Enrollments from September 24, 2018 to February 28, 2022

	PSH Pilot				TSH Pilot				ESRO Pilot			
	No		Yes		No		Yes		No		Yes	
	N	%	N	%	N	%	N	%	N	%	N	%
Characteristics at Each Enrollment												
Total Enrollments	5,765	100	410	100	5,884	100	1,134	100	10,028	100	539	100
Age												
Median (P25-P75)	53 (43-60)		54 (41-60)		38 (31-51)		42 (32-54)		41 (32-53)		46 (34-56)	
AIDS												
No	1,922	33.34	137	33.41	3,208	54.52	583	51.41	4,812	47.99	232	43.04
Yes	3,843	66.66	273	66.59	2,676	45.48	551	48.59	5,216	52.01	307	56.96
Baseline VLS												
Yes (<200)	4,147	71.93	313	76.34	2,720	46.23	657	57.94	4,258	42.46	257	47.68
No (≥200)	1,091	18.92	68	16.59	1,767	30.03	335	29.54	3,554	35.44	172	31.91
Missing	527	9.14	29	7.07	1,397	23.74	142	12.52	2,216	22.10	110	20.41
Baseline CD4												
Median (P25-P75)	515 (312-764)		525 (300-797)		483 (256-717)		498 (284-727)		440 (221-680)		431 (212-721)	
Baseline Number of Laboratory Events												
Median (P25-P75)	2 (1-2)		2 (1-2)		1 (1-2)		2 (1-3)		2 (1-3)		2 (1-2)	
Enrollment Duration (days)												
Median (P25-P75)	1,254 (571-1,437)		1,214 (464-1,440)		79 (25-188)		139 (77-254)		122 (42-297)		272 (151-491)	
Enrollment Relative to COVID Pause*												
Pre-Pause (Unexposed)	4,501	78.07	355	86.59	2,135	36.28	525	46.30	3,785	37.74	239	44.34
During Pause (Exposed to Pause)	468	8.12	30	7.32	1,274	21.65	266	23.46	2,921	29.13	134	24.86
Post Pause (Unexposed)	796	13.81	25	6.1	2,475	42.06	343	30.25	3,322	33.13	166	30.80

*For a 6-month outcome, enrollments from September 19-March 20, 2020 would have outcomes monitored 'During Pause'

P-values for characteristics at each enrollment are not shown as they are not independent tests, given clients have multiple enrollments.

Supplemental Table 3. Viral Suppression Status at 6 Months Post-Enrollment by Housing Type, Duration of Enrollment – Among Enrollments Unexposed to the COVID Pause and Enrolled through February 28, 2022

	Enrollment duration	Non-Pilot					Pilot				
		Denominator		VLS		P-value for VLS by enrollment duration	Denominator		VLS		P-value for VLS by enrollment duration
		N	Col %	N	Row %		N	Col %	N	Row %	
PSH Unexposed to Pause	<30 days	62	1.17	27	43.55	<.0001	5	1.32	3	60.00	0.0329
	30-179	267	5.04	165	61.80		40	10.53	26	65.00	
	180+	4968	93.79	3643	73.33		335	88.16	264	78.81	
	<30 days	1283	27.83	575	44.82	<.0001	44	5.07	27	61.36	0.0032

TSH	30-179	2174	47.16	1250	57.50		479	55.18	290	60.54	
Unexposed to Pause	180+	1153	25.01	757	65.65		345	39.75	246	71.30	
ESRO	<30 days	1273	17.91	548	43.05	0.0091	6	1.48	3	50.00	0.6682
Unexposed to Pause	30-179	2986	42.01	1364	45.68		124	30.62	64	51.61	
	180+	2848	40.07	1351	47.44		275	67.90	135	49.09	
Unexposed: 6-month outcome follow-up is not during pause for enrollments before Sept 20, 2019 or enrollments after July 31, 2020. Exposed: Outcome follow-up is during COVID pause for enrollments from Sept 20, 2019 to 31 July 2020.											
P-value is based on two-sided Cochran Armitage test for trend in proportions											

Supplemental Table 4. Viral Load Suppression Six Months Following Enrollment by Housing Type and Timing of Enrollment

	PSH			TSH			ESRO		
	Denominator	VLS		Denominator	VLS		Denominator	VLS	
	N	N	%	N	N	%	N	N	%
Enrollments Before Pause	4,856	3,589	73.91	2,660	1,655	62.22	4,024	2,032	50.50
Enrollments During Pause	498	328	65.86	1,540	782	50.78	3,055	1,282	41.96
Enrollments After Pause	821	539	65.65	2,818	1,490	52.87	3,488	1,433	41.08
Before: 6-month outcome follow-up is not during pause for enrollments before Sept 20, 2019									
During: Outcome follow-up is during COVID pause for enrollments from Sept 20, 2019 to 31 July 2020.									
After: 6-month outcome follow-up is not during pause for enrollments after July 31, 2020									

Supplemental Table 5. Pilot Impact on Housing Types: Stable, Transitional, Emergency (non-Transitional), or Unspecified Housing Types at 12 Months– Among Clients Unexposed to Pause and Enrolled as of February 28, 2022

	Non-Pilot			Pilot			Pilot vs Non-Pilot Effect on Enrollment in Housing Type at 12 Months	
	Denominator	Housing Type		Denominator	Housing Type		Unadjusted RR (95% CI)	Adjusted RR (95% CI)
	N	N	%	N	N	Row		
PSH – Unexposed to Pause								
Stable Housing	4,752	4,368	91.92	333	305	91.59	1.00 (0.96, 1.03)	0.99 (0.96, 1.02)
Transitional Housing	4,752	27	0.57	333	2	0.60	1.06 (0.25, 4.43)	*
Emergency Housing^	4,752	61	1.28	333	1	0.30	0.23 (0.03, 1.68)	0.25 (0.03, 1.76)
Unspecified Housing	4,752	296	6.23	333	25	7.51	1.21 (0.81, 1.78)	1.32 (0.89, 1.96)
TSH – Unexposed to Pause								
Stable Housing	2,998	1080	36.02	564	233	41.31	1.15 (1.03, 1.28)	1.17 (0.97, 1.42)
Transitional Housing	2,998	382	12.74	564	107	18.97	1.49 (1.22, 1.81)	1.50 (1.17, 1.91)
Emergency Housing^	2,998	634	21.15	564	87	15.43	0.73 (0.59, 0.90)	0.79 (0.65, 0.97)
Unspecified Housing	2,998	902	30.09	564	137	24.29	0.81 (0.69, 0.94)	0.83 (0.71, 0.98)
ESRO – Unexposed to Pause								
Stable Housing	2,267	555	24.48	104	22	21.15	0.86 (0.59, 1.26)	0.85 (0.59, 1.24)
Transitional Housing	2,267	146	6.44	104	4	3.85	0.60 (0.23, 1.56)	0.60 (0.23, 1.57)
Emergency Housing^	2,267	736	32.47	104	52	50.00	1.54 (1.26, 1.89)	1.54 (1.26, 1.88)
Unspecified Housing	2,267	830	36.61	104	26	25.00	0.68 (0.48, 0.97)	0.69 (0.49, 0.97)
*Poisson model								
**Model did not converge. Too few observations.								

^Emergency housing, excluding transitional
Unexposed: Includes enrollments before March 22, 2019 and includes enrollments from July 31, 2020. These clients were unexposed to the COVID pause and 12-month outcome follow-up is not during the COVID pause. No ESRO cases were enrolled before March 22, 2019. The number unexposed is lower for an outcome monitored through 12 months than an outcome monitored through 6 months because more people have follow-up (through 12 months) that occurs during the COVID pause
PSH clients were not randomly selected, and the models adjust for baseline VLS, aids at enrollment, transmission risk, age, gender, race, number of laboratory events at enrollment and year of diagnosis
TSH clients were not randomly selected, and the models adjust for baseline VLS, aids at enrollment, transmission risk, age, gender, race, number of laboratory events at enrollment and year of diagnosis
ESRO clients were randomly selected, and the model adjusts for AIDS, enrollment VL, and enrollment CD4. These variables were chosen as appeared unbalanced after randomization

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