C.H.A.I.N. REPORT 2021-4

Functional Health and Wellness among Older Adults with HIV

C.H.A.I.N.

Angela A. Aidala
Maiko Yomogida
Mary Clare Lennon
Lynn Ngo
Lilian Ha

Columbia University
Mailman School of Public Health
In collaboration with
NYC Department of Health and Mental Hygiene,
the New York State Department of Health AIDS Institute,
and the HIV Health & Human Services
Planning Council of New York

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Introduction

The intersection of HIV, aging and health is an urgent issue due to the increasing number of people over age 50 with HIV. More than half of people with HIV (PWH) in New York State (NYS) are aged 50 and older (New York State Department of Health AIDS Institute, 2022) and that proportion will only rise over the coming years. However, by many indicators, current medical and social service systems are largely unprepared to deal with the unique needs of the growing numbers of older PWH (Brennan-Ing et al., 2021). Older PWH, especially those who have had HIV for 20 years or more, experience health changes and challenges consistent with advanced aging, typically at an earlier age than among the general population (NYSDOH AIDS Institute Guidance, 2020).

As well as experiencing many of the same health concerns as the general population age 50 and older, compared to age peers without HIV, PWH have higher rates of multiple chronic conditions including diabetes, hypertension, respiratory disease, cardiovascular disease (CVD), and cancer (Yang et al., 2019). A previous study by Shah et al. found that among a sample of PWH over 55 years of age in New York City, 89% had comorbid conditions, the most common of which were hypertension, chronic airway disease, and diabetes (Shah et al., 2002). A recent study by Tesoriero et al. found that PWH in New York State experience poorer COVID-related outcomes across all ages; this is particularly significant given the increased risk of COVID at older ages (Tesoriero et al., 2021). Furthermore, overall life expectancy as well as comorbidity-free life expectancy remain lower for PWH compared to those not living with HIV, and 70% of deaths among PWH can be attributed to non-HIV-related causes (Marcus et al., 2020; NYC DOHMH 2019). Previous CHAIN research on the experiences of older PWH in NYC and the Tri-County region found that the majority of older PWH perceived themselves to be in good health; however, almost all older participants reported at least one co-morbid condition, with many reporting more than one, including comorbidities associated with increased mortality risk among PWH (Vardy & Messeri, 2013; Messeri, Ball & Sharma, 2016).

In addition to physical health and functioning, depression, anxiety, and other mental health issues are common (Fang et al., 2015). Psychosocial issues that are more likely to affect older PWH include loneliness and poor social support (Roger et al., 2013; Ruiz et al., 2022). Loneliness, generally defined as a subjective lack of social support or desired companionship, and social isolation, characterized by having a limited social network and infrequent social contacts, are in turn significantly associated with a greater risk of all-cause mortality and cognitive decline (Perissinotto et al., 2012; Valtorta & Hanratty, 2012; Wang et al., 2023). Prior CHAIN reports found that measures of social support generally diminished with age (Vardy & Messeri, 2013).

For older PWH, daily life stressors are often compounded by multiple layered stigma associated with ageism, in addition to stigma and discrimination associated with HIV-status, race, ethnicity, gender, sexual orientation, and/or poverty, that can serve as barriers to accessing formal support services (Shen et al., 2019; Shippy & Karpiak, 2005). Shippy and

Karpiak previously found that 40% of older PWH in NYC felt that it was difficult to access formal services, citing lack of knowledge of where to go and feeling that services were geared towards younger adults.

Recent CHAIN findings from NYC and Tri-County (Westchester, Rockland, and Putnam counties) also indicate substantial unmet need for supportive services. A quarter of PWH aged 50+ needed but did not utilize non-medical case management (Harned, Yomogida & Aidala, 2022). Service gaps among older PWH for employment assistance and food assistance were also relatively high, particularly among NYC respondents (Harned, Yomogida & Aidala, 2022). These findings thus indicate a need for more targeted efforts to ensure aging PWH are engaged in needed services.

This report builds on previous CHAIN research by evaluating measures of successful aging among older PWH in our sample. The aims of the current study are to address the following research questions: 1) To what extent do older PWH (ages 50+) experience functional limitations or disabilities that compromise their self-care and independence? 2) What are risks and protective factors for successful aging regarding health/mental health functioning and quality of life? In addition to age and years living with HIV we examine social determinants of health (SDOH) including race/ethnicity, socioeconomic circumstances, housing and neighborhood resources, stigma and discrimination. 3) What is the impact of HIV and/or antiretroviral therapy (ART), chronic disease comorbidities, and their combined effects for health and wellbeing among aging PWH? Findings from this study can help inform policy and programmatic decision-making to improve the lives of older PWH in the New York Eligible Metropolitan Area (EMA).

Key Findings

- 42% of NYC and 31% of Tri-County CHAIN participants are at high risk for frailty - indicating risk for poor health outcomes and problems with functioning independently that includes social as well as physiological and cognitive dimensions. Less than 10% age 50 or older are classified as "thriving."

- Almost all older NYC participants (97%) and 76% of older Tri-County participants reported having at least one non-HIV comorbidity associated with increased mortality risk among PWH. Four out of five in NYC and half of Tri-County older cohorts reported three or more comorbidities.

- Among all older PWH in our sample, about 70% score 'low' on a standardized scale of physical health functioning, and 40% score 'very low'.

- High life stress scores, chronological age, and number of comorbidities are the strongest predictors of challenges to successful aging, indicated by lower physical health functioning and higher frailty score, and being negatively associated with thriving.

- The strongest predictors of high frailty index score are indicators of cumulative disadvantage including education level, poverty, and life stressors, as well as current problem drug use**.**

- Age at diagnosis and number of years living with HIV do not seem to affect health outcomes such as low physical or mental health functioning, high frailty index scores, or positive indicators of thriving among PWH age 50+, when chronological age, resources and disadvantages, non-HIV comorbidities, and life stressors are controlled.

- Black and Latino MSM generally have lower frailty index scores and higher rates of thriving than Black and Latino heterosexual men and women with HIV age 50+. Latina cisgender women are more likely to have low physical health functioning, and have the lowest rates of thriving compared to other older PWH.

Methods

Sample

The data used for this report are based on in-person interviews with PWH conducted by the Community Health Advisory & Information Network (CHAIN) Project from 2002-2020. CHAIN is an ongoing cohort study of PWH in New York, conducted since 1994. Multiple cohorts have been recruited using a two-stage stratified probability sampling strategy designed to enroll a representative sample of PWH from New York City and the Tri-County region, age 20 and older, who had some contact with the service system within the prior 12 months. For each cohort, a listing was compiled of known HIV service providers, and 30–40 service sites were randomly sampled, stratified by medical or social service agency, and borough or county. Staff in selected agencies assisted with recruitment of a random sample of clients, proportional to total client enrollment, either drawn from agency rosters or using sequential enrollment procedures. For additional details on sampling and recruitment see Messeri et al. (1996).

This report is based on information provided by interviews conducted with CHAIN Project cohorts enrolled in 2002-2004, 2009-2011, and 2015-2020. Follow-up interviews were conducted in NYC approximately every 18-24 months with 80% or greater retention rate. A repeated cross-sectional design was implemented in Tri-County beginning in 2008 with participants eligible for re-interview every 24 months. The average number of interviews completed per person was 3.9 in New York City and 2.3 in Tri-County.

The current study is based on 7,764 interviews (5,471 in NYC and 2,293 in Tri-County) conducted between 2002 and 2020 with 2,395 individual PWH (1,407 in NYC and 988 in Tri-County). Over 3,400 interviews were completed with PWH age 50 or older; 688 study participants were 50+ years old at study enrollment.

Study Variables

The CHAIN Project gathers data from the perspective of PWH on their lives and experiences, including socioeconomic conditions, family and living situations, physical and mental health and experiences accessing medical, behavioral health, and social services, as well as HIV care continuum and health outcome indicators. Study variables for this analysis were chosen based on the theoretical and empirical evidence suggesting the variable has an effect on healthy aging and quality of life and/or engagement and retention in HIV medical care and viral suppression. A number of outcomes were selected for analysis to indicate successful aging including multi-item indicators of physical and mental health functioning, frailty, and thriving.

Selection of variables to examine factors affecting divergence in successful aging were informed by theories emphasizing cumulative advantages/disadvantages affected by social determinants of health over the life course (Ferraro & Shippee, 2009; O'Rand, 2016).

Measure of Healthy Aging

Table 1 presents definitions for aging outcome variables (dependent variables).

Frailty is considered as a state of increased risk for poor health outcomes and problems with functioning independently and includes social as well as physiological and cognitive dimensions. Frailty was operationalized using an adapted version of the Edmonton Frail Scale (EFS) (Rolfson, 2006). We adapted the EFS to exclude performance-based items and adopted some questions for an HIV positive population. For example, the indicator for social support was limited to friends and family who were aware of respondents' HIV status. Domains evaluated include cognition, general health status, functional independence, social support, medication use, and depressed mood. The frailty index score has a possible range of 0 – 20; a higher score means greater frailty risk. A high frailty index score is an index z-score above 1.0. The specific questions and scoring for the Frailty Index and High Index score are found in the Appendix.

Thriving is a composite binary indicator based on positive physical health functioning, positive mental health functioning, and low frailty index score indicated by adequate physical health functioning (PCS>=50) and adequate mental health functioning (MCS>=42) and z-score of the frailty index < -0.5.

Table 1. Measures – Aging Outcomes Variable Definitions

Variable	Definition
Aging Outcome Variables	
Frailty Index	Adapted from Edmonton Frail Scale[1] with indicators for cognition, general health status, functional independence, social support, polypharmacy medication use, and depressed mood. Possible range of 0 – 20; a higher score means greater frailty risk
High Frailty Index Score	Z-score of Frailty Index Score >=1.0
Physical Health Functioning	Physical Component Summary score (PCS) on MOS-SF36/12[2] PCS>50 indicates adequate physical health functioning PCS<50 low physical health functioning PCS<=40 very low functioning
Mental Health Functioning	Mental Component Summary Score (MCS) on MOS-SF36/12 MCS>42 indicates adequate mental health functioning MCS <42 low mental health functioning MCS<=37 very low functioning
Thriving	Z-score of Frailty Index Score < -0.5 and adequate physical health functioning (PCS>=50) and adequate mental health functioning (MCS>=42)

1. Rolfson (2006)
2. Ware et al. (1996; 2007)

HIV Care Continuum

Our HIV care continuum indicators are meant to assess level of access to and individual engagement and follow-through with care recommendations. Definitions of outcome indicators are summarized in Table 2.

Table 2. Measures – HIV Care Continuum Variable Definitions

Variable	Definition
HIV Care Outcomes	
Consistent Care	No or only one missed scheduled appointments for HIV medical care during the past 6 months, AND did not have a period of 'drop out'—intentionally stopped going to the doctor and had no HIV medical appointments for 6 months or more, since last interview.

Variable	Definition
HIV Care Outcomes	
Appropriate Care	Meeting the minimum clinical practice standards at the time of interview. Prior to 2013, at least one visit with blood work and complete physical in the past 6 months if CD4 count is 350 or above and viral load is 400 or less; or at least 2 visits with at least one blood work and one complete physical, and on ARV if CD4 count is less than 350 or viral load is over 400. After June 2013, care is not appropriate if not taking ARV, regardless of CD4 or viral load.[1]
Adherent ARV Use	Adherent ARV indicated by taking any recommended ARV regimen and participant report of taking medications "exactly as prescribed, almost never missing a dose" and not missing any medications in the two days preceding the interview. Not adherent to recommended ARV regimen includes those who are not taking any antiretroviral medications and those taking medications not consistent with DHHS's guidelines in effect at the time of the interview (NIH, AIDSinfo.nih.gov).
Viral Suppression	Self-reported most recent HIV viral load as an actual numerical value or report medical provider designation as "undetectable," or "good." Viral load of <400 copies (or <200 copies from November 2009 and after), or provider report as "undetectable," or "good" were coded as "suppressed viral load" and >400 copies (or >200 copies from November 2009 and after) or reported as "bad" as "unsuppressed viral load."

1. Based on HHS HIV/AIDS Bureau (HAB) criteria for minimum clinical standards of care (HAB.HRSA.gov) and NIH AIDS Info guidelines (AIDSinfo.nih.gov).
2. Validation studies comparing CHAIN study coding of respondent self-report viral load has found 86% concordance with lab reports in HIV surveillance data (Penrose & Aidala, 2019).

Resources and Disadvantages

Variables capturing economic and social determinants of health contributing to cumulative advantage/disadvantage and inequities in aging among PWH include indicators of individual and neighborhood socioeconomic disadvantage.

Individual resources or disadvantages include education, coded as less than high school, high school/GED, post-secondary; household income measured as above or below the federal poverty threshold (U.S. Census); and housing status classified as *homeless*, living in a homeless shelter or a single room occupancy (SRO), or sleeping in a car, on the street or other place not meant for sleeping; *unstable,* living in a temporary or transitional housing program, a residential treatment program with no other address, or temporarily doubled up with friends or family; or *stable,* living in permanent housing, in their own apartment or home.

Disadvantaged neighborhood is measured by the Area Deprivation Index (ADI) created by the Health Resources & Services Administration and updated regularly. ADI allows for rankings of neighborhoods by socioeconomic disadvantage in a region of interest. The ADI is based on census tract indicators of income, education, employment, and housing quality. Our measure of disadvantaged neighborhood is the mean ADI score by zip code of residence, coded as above or below the mean ADI score for New York State.

History of incarceration is measured by self-report of prison or jail incarceration.

Other covariates

Comorbidities. We asked study participants a series of questions regarding specific non-HIV comorbidities at each interview period to track reports of diagnosed medical conditions and treatments. We collected information about *CVD-related conditions* (high cholesterol, hypertension, cardiovascular disease, or heart problems); *chronic respiratory diseases* (asthma, chronic sinusitis, obstructive pulmonary disease, bronchitis, or emphysema); *metabolic diseases* (diabetes); *cancer* (lung, rectal/anal, cervical, liver, other); *infectious diseases* (hepatitis, tuberculosis); *arthritis or rheumatism*.

We created a summary score of number of health conditions associated with increased mortality risk among PWH (NYDOHMH 2019 HIV Surveillance Annual Report) counting any CVD-related conditions, chronic respiratory diseases, diagnosed cancers, diabetes, and liver diseases (hepatitis) for a range of 0 – 10 health conditions.

HIV Stigma/Discrimination is measured by the 'Enacted Stigma 'subscale of Berger HIV Stigma scale (Berger et al. 2001). The subscale measures actual experiences of discrimination, devaluation, and prejudice by others based on HIV status. Scores standardized to range from 0 -100; above the mean is considered 'high 'HIV discrimination experience.

A separate measure of experience of discrimination for any reason, specifically in healthcare settings, is based on the Williams Everyday Discrimination Scale (Williams et al. 1997).

Life Stress. The Perceived Stress Scale (PSS) is used as a measure of the degree to which situations in one's life are appraised as stressful. Questions ask about current levels of stress, as well as capturing how unpredictable, uncontrollable, and overloaded respondents experience their lives (Cohen et al. 1983). Scores range from 0-20; above the mean is considered 'high 'stress.

Age, race/ethnicity, gender, NYC or Tri-County area of residence are included in all analyses.

Analysis

A series of descriptive analyses were conducted to understand the sample characteristics. Then, a series of random effects logistic regression was performed to estimate different age and aging variables' effects on physical and mental health functioning, high frailty index score, and thriving. We first performed random effects logistic regression on the entire sample, individually investigating each age-related variable to isolate which are most strongly associated with the healthy aging outcomes. We present these models unadjusted and adjusted for sociodemographics, region, resources and disadvantages, HIV stigma, health behaviors, comorbidities, HIV medical care and social service case management.

Finally, samples were restricted to those age 50 and above to closely evaluate the effect of aging and aging with HIV, as well as other factors associated with successful aging. Random effects logistic regression was conducted for the four aging outcome variables (physical and mental health, frailty, and thriving) with chronological age and number of years living with HIV included as predictors in all models. All analyses were conducted using Stata version 17.0 (Stata Corp, 2021).

Results

Sample Characteristics and Descriptive Findings

Sociodemographics

Table 3 displays sample characteristics for both NYC and Tri-County from the most recent interview, separated by age 50 and above and age below 50. For both NYC and Tri-County cohorts age 50 and above, about 4 in 5 are between 50 and 64 years of age (82% in NYC and 80% in Tri-County) and 1 in 5 are above age 65 (18% in NYC and 20% in Tri-County). For the younger age group, there are roughly equal proportions of respondents below 35 and 35 and above in NYC (45% vs. 55%, respectively), while a larger proportion are 35 and above in Tri-County (64%). There is a roughly equal distribution of male and female respondents in Tri-County for both older and younger groups, whereas a higher proportion of male respondents are included in the NYC cohort for both older and younger groups (54% and 65%, respectively). The vast majority of respondents are racial/ethnic minorities in both regions. In both regions, more than a third have less than a high school education, approximately 45% have a high school diploma or GED, and about 20% have more than a high school education.

Sixty percent or more of older PWH in both NYC and Tri-County are living alone. In terms of household composition, the younger Tri-County cohort stands out with only 29% living alone. The younger respondents in Tri-County are also more likely to be a single parent than other groups. One in ten older PWH in NYC and 14% in Tri-County are living with children under age 18 years old in their household.

Approximately one-fifth of older PWH in NYC and one-fourth in Tri-County are immigrants, born outside the United States, Puerto Rico or Virgin Islands. Over half of younger PWH in Tri-County are foreign born.

Table 3. Sociodemographic Characteristics

	NYC Cohort: 2013-20		Tri-County: 2015-19	
	Age 50+	**Age <50**	**Age 50+**	**Age <50**
Sample (N=)	427	519	116	136
Age (mean. SD)	58.8 (6.7)	35.9 (7.5)	59.2 (6.3)	37.7 (7.8)
18 – 34	0%	45%	0%	36%
35 – 49	0%	55%	0%	64%
50-64	82%	0%	80%	0%
65+	18%	0%	20%	0%
Gender				
Female	44%	33%	53%	51%
Male	55%	65%	47%	49%
Transgender	1%	3%	1%	0%
Race/Ethnicity				
White	7%	6%	10%	0%
Black	58%	47%	58%	41%
Latino/a	32%	41%	30%	55%
Other[1]	2%	6%	3%	4%
Education				
Less than High School Grad	38%	32%	37%	40%
High School/GED	46%	48%	42%	44%
Post Secondary	16%	20%	21%	16%
Household Composition				
Lives alone	67%	58%	60%	29%
Lives with children, solo parent	4%	7%	4%	18%
Lives with partner	13%	12%	8%	14%
Lives with partner and children	2%	4%	6%	8%
Lives with other adults	7%	11%	16%	19%
Lives with other adults and children	4%	5%	4%	10%
Place of Residence				
Bronx	29%	38%	--	--
Brooklyn	31%	27%	--	--
Manhattan	25%	19%	--	--
Queens	11%	10%	--	--
Staten Island	5%	6%	--	--
Putnam	--	--	1%	0%
Rockland	--	--	18%	21%
Westchester	--	--	81%	77%
Place of Birth				
United States	74%	73%	69%	39%
Puerto Rico/Virgin Islands	9%	4%	7%	7%
Other Country	18%	23%	24%	55%

Data from most recent interview.

[1] Asian, Native American, Other or Mixed race/ethnicity.

Resources and Disadvantages

Overall, older cohorts in both NYC and Tri-County have lower rates of economic hardship than younger cohorts (Table 4). Annual household incomes are lower among younger PWH in both NYC and Tri-County. Nonetheless, the proportion living below poverty threshold are similar in both older and younger groups (59% vs. 66% in NYC; 48% vs. 48% in Tri-County, respectively). There are differences in sources of income between younger and older cohorts. The largest source of income for older cohorts in both NYC and Tri-County is Supplemental Security Income (SSI; 56% and 45%, respectively), while for younger cohorts in both regions is wages from paid work (52% and 69%, respectively).

In terms of housing situation, older cohorts are less likely to be unstably housed or homeless (8% in NYC and 7% in Tri-County) compared to younger cohorts (33% in NYC and 18% in Tri-County). However, virtually every person in the sample is classified as needing housing assistance due to the high cost of housing and low levels of income. Even if they currently have their own apartment or home, many are extremely rent burdened, experience difficulty paying for utilities and/or are in housing with serious habitability issues. Approximately half of NYC and over 85% of Tri-County respondents live in a zip code where the Area Deprivation Index score is higher than the New York State (NYS) mean. Almost half or more of older PWH are food insecure (46% in NYC; 52% in Tri-County) although rates are somewhat higher among the younger cohort. The NYC older cohort has the highest rate of incarceration history (49%).

More than one-third of older PWH have experienced HIV-related stigma and discrimination with higher rates among Tri-County residents (36% in NYC; 45% in Tri-County). Rates of experiencing discrimination in health care settings are lower but not insignificant: 14% of older PWH in both NYC and Tri-County reported experiencing discrimination on any basis in a healthcare setting. Although reasons were not asked specifically, respondents mentioned race, gender, sexual orientation, substance use, being homeless, as well as HIV status. Life stress is high among both older and younger PWH; 40% or more score high on the Perceived Stress Scale (PSS) with higher scores seen among the younger population.

Health Behaviors and Health Care Characteristics

Health behaviors and health care characteristics including HIV continuum of care outcomes are displayed in Table 5. Rates of current smoking are the same for older and younger cohorts in both NYC (44% vs. 46%) and Tri-County (38% vs. 37%); older PWH are more likely to be former smokers. Similarly, older PWH have higher rates of lifetime problem substance use (hard drug use and/or problem drinking) but are less likely to be current users.

Table 4. Economic Resources, Disadvantage, and Hardship Indicators

	NYC Cohort 2013-20		Tri-County 2015-2019	
	Age 50+	**Age <50**	**Age 50+**	**Age <50**
Sample (N=)	427	519	176	76
Household Income[1]				
Less than $7,500	15%	36%	9%	20%
$7,500 to $35K	80%	55%	87%	64%
$35K or more	5%	8%	5%	16%
% Living below poverty threshold[2]	59%	66%	48%	48%
Source(s) of Household Income Includes[3]				
Wages, any paid employment	27%	52%	28%	69%
Supplemental Security Income (SSI)	56%	24%	45%	21%
Social Security Disability Income (SSDI)	24%	11%	31%	5%
Social Security (SS) or retirement pensions	13%	3%	21%	4%
Housing Status[4]				
Stable	93%	67%	93%	83%
Unstable	4%	16%	6%	15%
Homeless	4%	17%	1%	3%
Need Housing Assistance[5]				
Yes	99%	98%	100%	100%
Neighborhood Disadvantage[6]				
Area Deprivation Index higher than NYS mean	49%	53%	86%	87%
Food Insecurity[7]				
Yes	46%	56%	52%	57%
Financial Hardship[8]				
Yes	52%	70%	72%	76%
Stigma, Discrimination				
HIV stigma discrimination score above mean[9]	36%	55%	45%	41%
Experienced discrimination in health care setting[10]	14%	23%	14%	11%
Criminal legal involvement				
Ever jail or prison	49%	30%	33%	13%
Life Stress Scale Score				
High perceived stress score[11]	42%	54%	46%	58%

Data from most recent interview.

1 Annual household income including salaries, wages, public benefits, or other income, not including food stamps or rental subsidies
2 Income below the U.S. Census Poverty Threshold calculated by household composition and household income.
3 Income source of the previous year reported by any household member.
4 Housing situation over the prior 6 months: Unstable housing = temporary or transitional housing program, in alcohol or drug (AOD) or mental health treatment housing with no other address, or temporarily doubled up with friends or family. Homeless =individuals who describe themselves as homeless or report sleeping on the street, in a car or public transit, a shelter, or single room occupancy hotel (SRO).
5 Homeless/ unstably housed past 6 months OR rent burdened (report difficulty paying rent/ share of rent in past 6 months or insufficient income to secure housing indicated by FMR >50% of household income) OR report needing services or assistance in past six months to obtain stable, secure, appropriate housing, address habitability issues or avoid eviction or other housing loss.
6 Area Deprivation Index v2.0 (Kind et al. 2018) ranks neighborhoods by socioeconomic disadvantage considering income, education, employment and housing quality
7 Past 6 months self-report not enough money for food, sometimes or often not getting enough to eat, or going an entire day without eating anything at all during the past month, or self-report needing food assistance past 6 months.
8 Financial insecurity: reporting not money in the household for rent, utilities, food, out-of-pocket medical or dental care, or transportation "once in a while, fairly often, or often" in the past 6 months OR who self-reported needing financial assistance
9 Enacted Stigma subscale of HIV Stigma Scale (Berger et al., 2001) indicating experience of HIV-related stigma and discrimination
10 Specific question about discrimination in health care setting based on Everyday Discrimination Scale (Williams et al. 1997).
11 Above the mean for the Perceived Stress Scale (Cohen et al. 1988).

Table 5. Health Behaviors and Health Care Characteristics

	NYC Cohort 2013-2020		Tri-County 2015-2019	
	Age 50+	**Age <50**	**Age 50+**	**Age <50**
Sample (N=)	427	519	177	76
Tobacco Use				
Never	18%	40%	25%	48%
Former	38%	15%	37%	15%
Current	44%	46%	38%	37%
BMI				
<19	6%	5%	5%	3%
19-24	33%	41%	34%	34%
25+	61%	54%	61%	64%
Current Problem Drinking[1]				
Yes	7%	12%	5%	9%
Current Hard Drug Use[2]				
Yes	10%	17%	3%	8%
Problem Substance Use[3]				
Never	20%	49%	41%	67%
Former	65%	27%	53%	20%
Current	15%	25%	6%	13%
Comprehensive Primary Care[4]				
Care coordinated, comprehensive, and accessible for emergency	75%	68%	89%	83%
Consistent Care[5]				
≤ 1 missed scheduled appointments past 6 months; no period of intentional dropping out of care	83%	77%	93%	89%
Appropriate HIV Care[6]				
Care meets clinical practice standards at the time of interview	55%	51%	20%	23%
Adherent ARV Use[7]				
ARV medications taken as prescribed	69%	68%	77%	85%
Viral Suppression[8]				
HIV Viral Load Suppressed	91%	88%	95%	94%

Data from most recent interview.

1 Heavy or problem drinking= positive on the CAGE questionnaire (Ewing, 1984) – or drinking weekly or more often and drinking 5 or more drinks on days when drinking (an indicator of 'binge drinking).

2 Current hard drug use refers to use of heroin, cocaine, crack, or methamphetamine in the past 6 months.

3 Problem substance use refers to problem drinking or hard drug use or both. Current is in the past 6 months.

4 Has medical provider considered in charge of overall HIV condition; provides routine check-ups, medical tests, vaccinations; someone you could always go to for information or advice about a health concern; can call 24 hours a day in case of emergency.

5 Missed no or only 1 scheduled appointment for HIV medical care during past 6 months AND did not have a period 'drop-out' when intentionally had no HIV medical appointments for 6+ months

6. HIV care meets minimal clinical practice standards at the time of interview (HAB.HRSA.gov; AIDSinfo.nih.gov .

7. Taking any recommended ARV regimen and report taking medications "exactly as prescribed, almost never missing a dose" and report not missing any medications in the two days preceding the interview

8. Self-reported most recent HIV viral load as an actual numerical value or report medical provider designation as "undetectable" or "good." Viral load of <200 copies, or provider report as "undetectable," or "good" were coded as "suppressed viral load."

The majority of respondents reported having comprehensive primary care, which is coordinated, comprehensive, and accessible for emergencies. The rates are lower in NYC than in Tri-County, and lower among younger cohorts than older cohorts. Regarding HIV care continuum indicators, in NYC, about half of respondents reported receiving appropriate care among both older and younger PWH (Table 5 and Figure 1). Over two thirds reported taking antiretroviral medications as prescribed. Receiving appropriate HIV care—care that meets clinical practice standards—seems to be a challenge in Tri-County where only 1 in 5 are receiving appropriate care. Despite a sub-optimal level of receipt of appropriate care and adherent ARV use, HIV viral suppression is high overall in both regions.

Figure 1. HIV Care Continuum Outcomes by Age: NYC

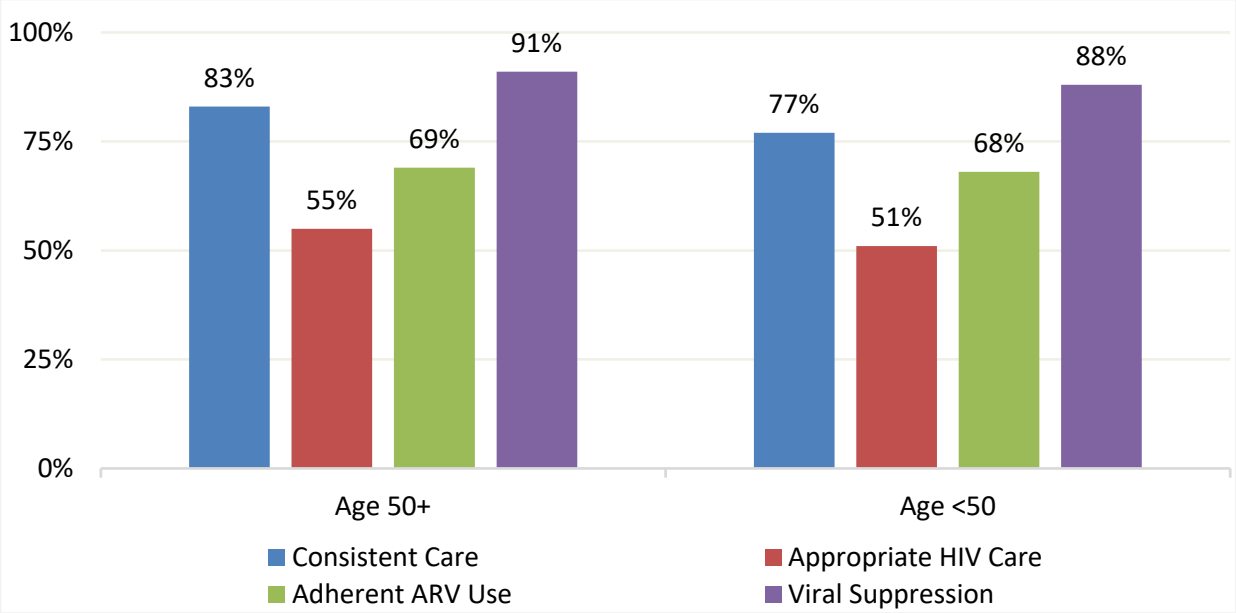
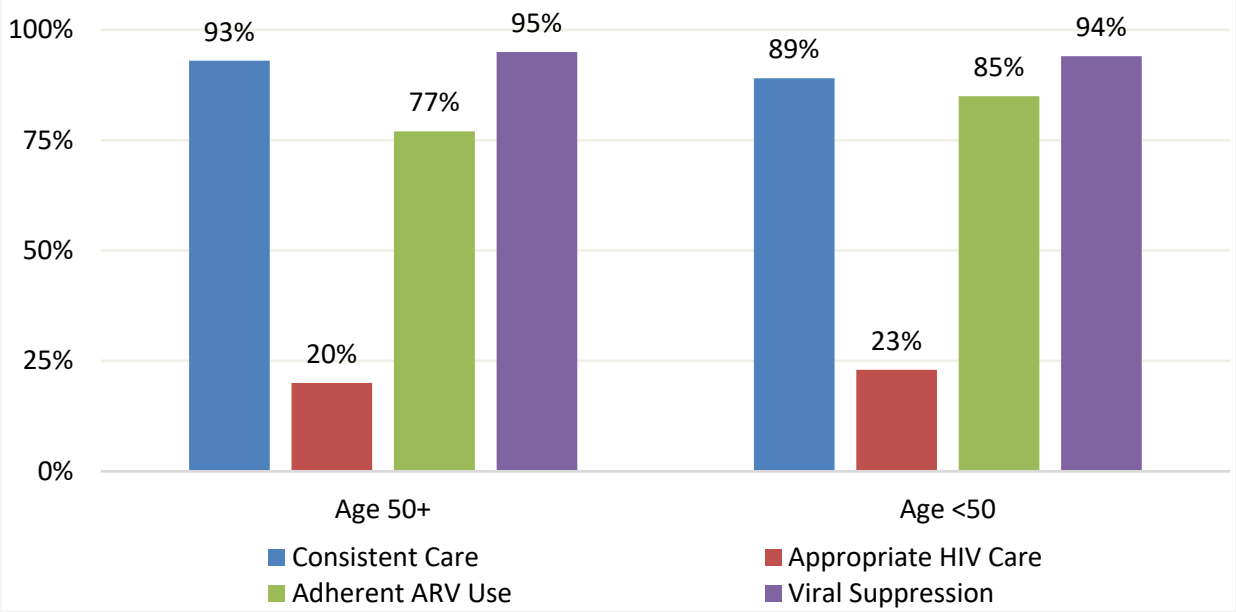


Figure 2. HIV Care Continuum Outcomes by Age: Tri-County



HIV Testing and Entry into Care

Most of the older cohorts received their HIV diagnosis between the ages of 35 and 49 (69% in NYC and 62% in Tri-County), with years of diagnosis ranging from 1981 to 2015. While most study participants entered care within three months of diagnosis, about a quarter of NYC and one fifth of Tri-County respondents delayed entry into care, often delaying for 12 months or more (Table 6).

The great majority of older PWH in NYC (81%) and almost half of those in Tri-County (47%) did not think about HIV testing prior to the one at which they received their HIV diagnosis. Consistent with the push for universal HIV testing and HIV testing at regular check-ups, higher proportions of younger cohort in both NYC and Tri-County reported testing previously. However, about half of all respondents reported having some medical problems, and close to a third reported major health problems when they were first diagnosed, indicating a delayed testing opportunity and for many, a more advanced stage of HIV disease. Current age was not associated with timely entry into care; approximately 75% of NYC participants and 80% of Tri-County respondents were initiated into HIV care within 3 months of diagnosis (i.e. had their first visit for HIV medical care for testing and monitoring, although may not have initiated medication regimen at that time). Rates of 'delayed' first visit for any HIV medical care did vary by year of diagnosis and were higher (30-33%) among participants diagnosed prior to 1996 for both older and younger cohorts (data not shown).

Considering HIV risk exposure, older cohorts in both NYC and Tri-County were more likely to have a history of injection drug and younger cohorts were more likely to report a history of male same sex experience (MSM). During the year they were diagnosed with HIV, rates of disadvantage and life challenges were similar among older and younger cohorts. 25% or greater did not have a regular place to live, and more than one in ten had no regular means of financial support. Approximately a third reported using drugs regularly and less than two thirds had medical insurance during the year they were diagnosed with HIV.

Non-HIV Comorbid Conditions

As expected, older adults are more likely to have non-HIV comorbid conditions than younger counterparts (Table 7). Almost all older NYC respondents (97%) and 76% of older Tri-County respondents reported having at least one non-HIV comorbidity associated with increased mortality risk among PWH. Four out of five in NYC and half of Tri-County older cohorts reported three or more comorbidities. The median number of comorbidities among older NYC respondents is 4 and among older Tri-County respondents is 2. Although the overall rates of comorbidities are much lower among younger cohorts, 79% of NYC and 44% of Tri-County younger cohorts reported at least one comorbidity. Notably, the younger cohorts exceeded the rates of older cohorts for hepatitis (other than hepatitis C) in both regions. The most commonly reported comorbidities among older PWH are hepatitis, hypertension, and high cholesterol.

Table 6. HIV Testing and Entry into Care

		New York City		Tri-County	
		Age 50+	**Age <50**	**Age 50+**	**Age <50**
	Total Sample	(n=333)	(n=1,058)	(n=330)	(n=632)
Year of HIV Diagnosis	<1991	33%	18%	27%	18%
	1991 – 1996	34%	27%	31%	30%
	1997-2004	30%	26%	26%	32%
	2005-2011	3%	18%	12%	15%
	2012+	0%	12%	4%	4%
Age at Diagnosis	Perinatally Infected	0%	4%	0%	<1%
	<18 years	0%	3%	0%	2%
	18 - 34 years	10%	69%	13%	61%
	35-49 years	69%	24%	62%	37%
	50+ years	21%	0%	25%	0%
Prior Testing	Didn't think about it	81%	64%	47%	26%
	Thought about -didn't do	11%	9%	39%	54%
	Got tested & negative	8%	27%	13%	20%
Testing Site Linkage to Care	Yes, actively facilitated	38%	37%	53%	50%
Time from Diagnosis to 1st Visit for HIV Medical Care	0-3 Months	75%	74%	81%	80%
	4-12 Months	7%	10%	11%	10%
	>12 Months	18%	15%	9%	10%
Risk Exposure Group	MSM	17%	37%	14%	21%
	IV Drug Use	38%	14%	30%	19%
	MSM & IV Drug Use	7%	4%	2%	2%
	Heterosexual/Other	38%	45%	54%	57%
Health Status when First Aware HIV+	No medical problems	45%	58%	47%	53%
	Minor problems	27%	24%	18%	20%
	Major problems	27%	18%	35%	27%
Living Situation when first diagnosed	Stable	61%	53%	71%	64%
	Unstable, Homeless	26%	31%	15%	22%
	In jail or treatment	11%	9%	9%	6%
Financial Support when diagnosed	Working	49%	48%	58%	55%
	Receiving benefits	30%	21%	22%	19%
	No regular means of support	10%	12%	10%	14%
Friendships when first diagnosed	Many close friends	37%	37%	35%	34%
	Only a few close	39%	40%	45%	39%
	Not really any close	23%	23%	20%	27%
I was married/in a partner relationship…		54%	45%	57%	54%
I was drinking a lot…		24%	20%	16%	20%
I was using drugs regularly…		39%	33%	28%	28%
I had medical insurance that would cover all or most of my care…		59%	60%	68%	59%

Table 7. Non-HIV Comorbid Conditions

	NYC Cohort 2013-20		Tri-County 2015-2019	
	Age 50+	**Age <50**	**Age 50+**	**Age <50**
Sample (N=)	427	519	177	75
CVD Related Conditions				
High cholesterol	63%	25%	37%	15%
Hypertension	67%	30%	40%	16%
Heart Disease	32%	13%	16%	3%
Chronic Respiratory Diseases				
Asthma	41%	42%	27%	17%
Other chronic respiratory diseases (COPD, chronic bronchitis, emphysema)	54%	29%	36%	5%
Metabolic Diseases				
Diabetes	27%	8%	19%	4%
Non HIV-Related Cancers				
Cancer (lung, rectal/anal, cervical, liver, other)	11%	5%	6%	3%
Cervical dysplasia[1]	31%	16%	26%	20%
Infectious Diseases				
Hepatitis C	21%	8%	23%	5%
Hepatitis, other	80%	92%	78%	95%
Chronic sinusitis	37%	17%	16%	5%
Tuberculosis	24%	7%	14%	7%
Other				
Arthritis or rheumatism	60%	12%	35%	11%
Number of comorbidities[2]				
0	2%	21%	23%	56%
1-2	17%	50%	29%	33%
3+	81%	29%	47%	11%
Median	4	1	2	0
Comorbidity Associated with Increased Mortality Risk among PWH	97%	79%	76%	44%

Data from most recent interview. Comorbidities cumulative - reported as ever diagnosed.

1 Cervical dysplasia potential risk for cancer - asked only of female respondents.

2 Number of comorbidities from among those listed.

3 Has at least one of the following: CVD-related conditions, diagnosed cancer, chronic respiratory disease, diabetes, liver disease (hepatitis). (NYDOHMH 2019 HIV Surveillance Annual Report)

Functional Limitations, Frailty and Thriving

Physical and Mental Health Functioning

Table 8 and 9 present physical and mental health functioning summary scores, as well as component subscales and their indicators. As expected, there is a significant difference in physical health functioning between older and younger cohorts (Table 8). About 70% of older PWH (68% in NYC and 67% in Tri-County) score below the cut point on the summary scale for 'low' physical health functioning, indicating some degree of functional limitation, and 40% score 'very low', a score seen among individuals with disabilities associated with limitations in use of arms and/or legs (Ware et al., 2007). In contrast, under 40% of younger PWH have low physical health functioning scores and only 16% and 13% score at the very low level (NYC and Tri-County respectively).

The biggest difference between the younger and older cohorts seems to be regarding mobility; a third or more of older adults reported that they are limited a lot in climbing several flights of stairs and one in five reported limitations in engaging in moderate activities such as carrying groceries. In addition, pain also contributes to low physical health functioning. Half of older adults in NYC and 40% in Tri-County reported that bodily pain interfered with their daily functions. Rates of mobility limitation and pain experience are much lower among younger cohorts. At the same time, there are not large differences in proportions of older and younger cohorts self-reporting their general health as fair or poor in both NYC (30% vs. 26%, respectively) and Tri-County (24% vs. 17%).

Mental health functioning appears to be worse in younger than older PWH in the current sample (Table 9). In NYC, almost half (46%) of older adults, but 60% of those under age 50, score 'low' on a standardized measure of mental health functioning, indicating clinically significant mental health symptoms. One-fourth (26%) of older adults, and 40% of those younger have very low mental health functioning, below the mean score in psychiatric inpatient populations (Ware et al., 2002). Differences are less in Tri-County; about 40% of older adults and 48% of younger adults have low mental health functioning, and 21% older adults compared to 24% of younger have very low mental health functioning. While similar proportion of adults in both older and younger groups in NYC reported that they felt calm and peaceful most or all the time during past 4 weeks, more younger adults reported that they were nervous most or all the time (23% compared to 11% of older adults). Young people in Tri-County were less likely than others to report that they were a happy person most or all the time.

Table 8. Physical Health Functioning - Summary Score and Subscales

	NYC Cohort 2013-20		Tri-County 2015-2019	
	Age 50+	**Age <50**	**Age 50+**	**Age <50**
Sample (N=)	427	519	176	76
General Health (Mean, SD)	**57.7 (26.8)**	**62.3 (29.0)**	**61.2 (25.8)**	**70.8 (25.8)**
Excellent/Very good	31%	42%	33%	52%
Good	40%	32%	43%	31%
Fair/Poor	30%	26%	24%	17%
Mobility, physical functioning (Mean, SD)	**60.1 (38.5)**	**82.4 (30.0)**	**59.9 (37.5)**	**83.7 (29.5)**
Limited "a lot" in these activities				
Moderate activities- moving a table, carrying groceries, vacuuming	22%	7%	18%	8%
Climbing several flights of stairs	33%	13%	35%	12%
Walking one block	9%	2%	12%	1%
Role limitations due to physical health (Mean, SD)	**62.2 (26.9)**	**74.5 (27.0)**	**61.9 (25.9)**	**80.0 (25.5)**
Most or all the time these problems with work or daily activities				
Accomplished less than you would like	17%	12%	17%	9%
Been limited in the kind of work or other activities you could do	19%	13%	17%	5%
Bodily pain (Mean, SD)	**61.7 (31.3)**	**74.8 (31.1)**	**66.6 (32.2)**	**82.3 (28.4)**
Moderately to extremely pain interfered with normal work outside the home or housework	48%	32%	40%	20%
Physical Health Functioning Summary Scale Score[1]				
PCS (Mean, SD)	**42.8 (11.2)**	**50.4 (10.1)**	**43.3 (11.6)**	**52.1 (9.9)**
% PCS >= 50 Adequate physical health functioning	32%	61%	33%	69%
% PCS < 50 Low physical health functioning	68%	39%	67%	31%
% PCS < 40 Very low physical health functioning	39%	16%	38%	13%

Data from most recent interview.

1 Physical health functioning based on adapted SF12/36 Physical Component Summary score (PCS); 50.0 is mean score for US population, >=5= indicates adequate physical health functioning; <50.0 indicates limitations in health functioning; <40 indicates very low physical health functioning, consistent with disability due to limitations in use of arms and/or legs. (Ware et al., 2002)

Table 9. Mental Health Functioning - Summary Score and Subscales

	NYC Cohort 2013-2020		Tri-County 2015-2019	
	Age 50+	Age <50	Age 50+	Age <50
Sample (N=)	427	519	176	76
Symptoms of depression or anxiety (Mean, SD)	**62.9 (21.8)**	**59.9 (23.1)**	**64.8 (20.0)**	**64.3 (22.9)**
Most or all the time during past 4 weeks have felt				
Downhearted and depressed	14%	18%	10%	15%
So down that nothing could cheer you up	10%	15%	6%	9%
A happy person	46%	51%	49%	35%
A very nervous person	11%	23%	11%	16%
Calm and peaceful	46%	42%	51%	52%
Energy, vitality (Mean, SD)	**56.0 (21.9)**	**59.4 (29.3)**	**60.1 (23.8)**	**71.7 (24.8)**
Most or all the time during past 4 weeks have felt				
Had a lot of energy	37%	44%	45%	65%
Felt tired	22%	39%	21%	19%
Role limitations due to mental health (Mean, SD)	**69.2 (26.5)**	**66.8 (28.4)**	**72.8 (26.0)**	**76.3 (27.6)**
Most or all the time these problems with work or daily activities				
Accomplished less than you would like	13%	20%	10%	11%
Didn't do work or other activities as carefully as usual	11%	15%	8%	9%
Social functioning (Mean, SD)	**32.9 (28.1)**	**34.0 (31.2)**	**29.0 (28.7)**	**25.0 (31.3)**
All or most of the time physical or emotional problems interfered with social activities with family, friends, neighbors or groups	14%	20%	13%	12%
Mental Health Functioning Summary Scale Score[1]				
MCS (Mean, SD)	**42.8 (8.2)**	**39.2 (8.5)**	**43.8 (8.7)**	**41.6 (8.2)**
% MCS => 42 Adequate mental health functioning	54%	40%	61%	52%
% MCS < 42 Low mental health functioning	46%	60%	39%	48%
% MCS < 37 Very low mental health functioning	26%	40%	21%	24%

Data from most recent interview.

1 Mental Health functioning based on adapted SF12/36 Mental Component Summary score (MCS); 50.0 is mean score for US population; => 42.0 indicates adequate mental health functioning; ≤42.0 indicates clinically significant mental health symptoms (depression, anxiety, impairment); <37.0 is mean score in psychiatric inpatient populations. (Ware et al., 2002)

Frailty and Thriving

42% of PWH over age 50 in NYC and 31% in the Tri-County region score high on an index of frailty --a composite measure that includes social as well as physiological and cognitive dimensions indicating a state of increased risk for poor health outcomes and problems with functioning independently (Rolfson et al. 2006). Older cohorts in both regions have higher rates than younger PWH on all frailty index domains other than depressed mood (Table 10). The largest discrepancy between the older and younger cohorts in both regions is found in the *functional independence domain,* in which 58% of older adults in both regions reported having limitations in climbing stairs, and about half reported limitations in moderate activities. In addition, 15% in NYC and 7% in Tri-County were receiving home care. Regarding *cognition,* rates of forgetting things and difficulty reasoning are higher among older PWH. Specifically, more than half of NYC older adults reported that they forget things and a third reported difficulty reasoning some, most, or all the time during the past 30 days.

Medication use can be problematic for older adults. Close to two thirds of older PWH in NYC and more than half in Tri-County reported polypharmacy (taking 5 or more prescribed medications) and 73% of NYC and 68% of Tri-County older PWH reported difficulty remembering to take their medications. Regarding *social support*, more than 60% of older PWH live alone - rates 10% higher among older compared to younger PWH in NYC, and in Tri-County, 30% higher. About one-fourth of older PWH have no or very few close friends or family members aware of their HIV status which limits potential sources of social support.

General health status indicators are fairly comparable across groups, though slightly more negative among older cohorts. 30% of PWH in NYC and 24% in Tri-County describe their health now as 'fair' or 'poor' and 14% and 13% respectively report one or more hospital stays in the six months prior to interview.

The composite *frailty index* is high among older PWH. 42% of PWH over age 50 in NYC and 31% in the Tri-County region have a high frailty index score—approximately double that of younger cohorts.

On the separate measure of thriving, an indicator of positive or successful aging measured by positive physical and mental health functioning and low frailty index score, only 6% of NYC and 7% of Tri-County older cohorts are classified as thriving. At the same time, while rates of thriving are higher among younger cohorts, only 13% of NYC and 20% of Tri-County younger cohorts are classified as thriving. However, the study participants in the younger cohort are a mean age of 37, suggesting that the overall rate of thriving is relatively low among middle-aged as well as older adults.

Table 10. Frailty and Thriving - Summary Scores and Component Indicators

	NYC Cohort 2013-20		Tri-County 2015-2019	
	Age 50+	**Age <50**	**Age 50+**	**Age <50**
Sample (N=)	427	519	176	76
Frailty Domains[1]				
Cognition				
Forget things some, most, or all the time	57%	46%	46%	33%
Difficulty reasoning some, most, all the time	33%	29%	29%	25%
General Health Status				
Health now fair or poor	30%	26%	24%	17%
Hospital stays last six months	14%	13%	13%	8%
Functional Independence				
Health now limits a little or a lot:				
Climbing several flights of stairs	58%	29%	58%	31%
Moderate activities e.g., move table, carry groceries	47%	21%	50%	15%
Received home care, services needed at home	15%	5%	7%	1%
Residential care, nursing home, or hospice	2%	1%	3%	0%
Social Support				
Lives alone	67%	58%	60%	29%
Fewer than 3 family members or close friends aware of HIV status	24%	29%	29%	52%
Medication Use				
Polypharmacy – taking 5 or more medications	63%	25%	56%	20%
Sometimes or often forget to take medications	73%	59%	68%	38%
Depressed Mood				
Most or all the time in the past month felt downhearted and depressed	10%	15%	6%	9%
Frailty Index Score				
Frailty Index (Mean, SD)	5.1 (2.2)	3.9 (2.0)	4.7 (2.0)	3.4 (1.8)
Standardized score (z-score)	0.65 (1.11)	0.05 (1.03)	0.42 (1.02)	-0.22 (0.89)
High Frailty Score (z-score above 1.0)	42%	21%	31%	12%
Thriving (%)	6%	13%	7%	20%
Positive on all composite indicators below				
Frailty z-score below -0.5	11%	27%	13%	36%
Adequate Physical Health Functioning (PCS>=50)[2]	32%	61%	33%	69%
Adequate Mental Health Functioning (MCS>=42)[3]	54%	40%	61%	52%

Data from most recent interview.

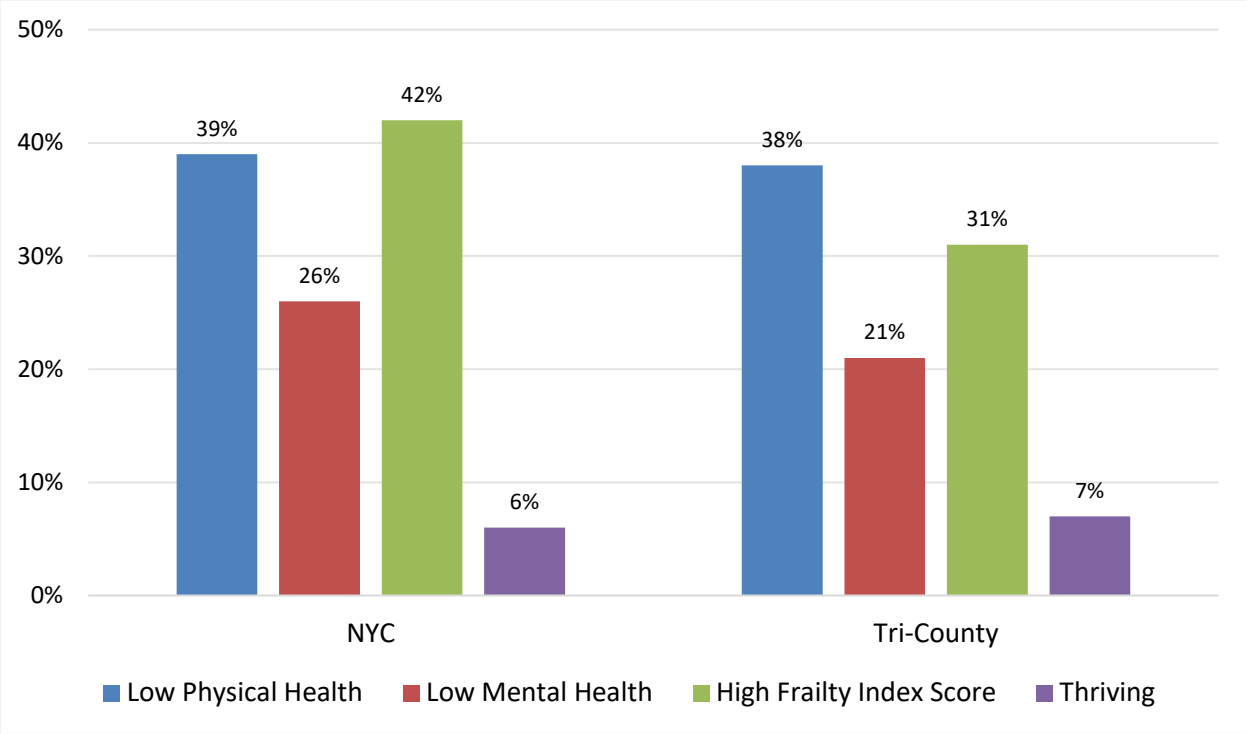
1 Adapted version of Edmonton Frail Scale (Rolfson et al. 2006). Measures for some indicators within frailty domains revised based on data available and/or relevant to HIV positive population.

2 At or above mean score among U.S. general population.

3 At or above score indicating no clinically relevant mental health symptoms.

Overall, older PWH can be characterized as having high rates of frailty with rates higher in NYC, and very low rates of thriving, under 10%, in both regions (Figure 3).

Figure 3. Physical Health Functioning, Mental Health Functioning, Frailty and Thriving among PWH Age 50+ by Area of Residence



Health Functioning Outcomes, Frailty and Thriving by Different Age-Related Variables

We conducted a series of random effects logistic regressions, using different age-related variables to predict key healthy aging outcomes among all study respondents: physical health and mental health functioning, frailty, and thriving (Table 11). We investigated individually each of several age-related variables to determine which are most strongly associated with these outcomes. All models control for gender, race/ethnicity, NYC vs. Tri-County residence, education, income, housing status, criminal legal involvement, neighborhood disadvantage, HIV discrimination, smoking, drug use, non-HIV comorbidities, appropriate HIV health care, and social services case management.

Continuous or categorical age variables indicating chronological age are the strongest predictors across all outcomes, including current age, binary age above or under 50 years, and current age among those age 50+. Older age at diagnosis is not associated with physical or mental health function but predicts frailty, and is associated with lower odds of thriving. Those diagnosed with HIV between 1991-1996 had increased odds of thriving; however, this is likely accounted for by the inclusion of perinatally infected respondents who are currently under 30 years of age.

Table 11. Mental Health and Physical Health Functioning, Frailty and Thriving by Age-related Variables: Current Age, Age at Diagnosis, Year of Diagnosis, and Years Living with HIV

	Low Physical Health		Low Mental Health		High Frailty Index		Thriving	
	OR	AOR	OR	AOR	OR	AOR	OR	AOR
1. Current age								
Age 20 – 87 yrs old	1.074***	1.055***	0.972***	0.985***	1.076***	1.063***	0.951***	0.956***
2. Age over/under 50 years								
Age 35 – 49 *(ref)*								
Age 50 yrs or older	2.171***	1.799***	0.686***	0.811**	2.314***	1.854***	0.460***	0.490***
Age under 35	0.233***	0.337***	1.506***	1.308*	0.388***	0.555**	1.760***	1.563*
3. Current age among 50+								
Age 50 – 87 yrs old	1.024	1.041**	0.966***	0.986	1.117***	1.118***	0.960*	0.950*
4. Age at diagnosis								
Age 50+	1.530	1.432	0.669*	0.933	2.316***	2.521***	0.538	0.440*
5. Year of HIV Diagnosis								
Before 1991 *(ref)*								
1991 - 1996	0.744	0.866	1.082	1.017	0.753	0.845	1.680**	1.574*
1997 - 2004	0.463***	0.636**	1.075	1.013	0.777	1.010	1.674*	1.393
2005 - 2011	0.124***	0.367***	1.458**	1.194	0.411***	0.870	2.203**	1.337
2012 and after	0.038***	0.180***	2.201***	1.616*	0.247***	0.722	4.385***	1.896
6. Number of years living with HIV								
# Years after tested HIV positive	1.049***	1.028***	0.985**	0.994	1.085***	1.053***	0.951***	0.976*

Note: OR =odds-ratio; AOR =adjusted odds ratio * p < .05; ** p < .01; *** p < .001

All models are logistic regression equations using random effects procedure to adjust for the dependency among multiple observations contributed by the same individual. Each model examines a single age-related variable as a predictor and all models control for gender, race/ethnicity, NYC v Tri-County residence, education, income, housing status, criminal legal involvement, neighborhood disadvantage, HIV discrimination, smoking, drug use, non-HIV comorbidities, appropriate HIV health care, and social services case management.

1. Continuous age variable among entire sample predicting low physical health functioning (n= 2,390 individuals, 7,735 observation points); low mental health functioning (n= 2,392 individuals, 7,761 observation points); high frailty index (n= 2,386 individuals, 7,664 observation points); thriving (n= 2,389 individuals, 7,740 observation points).
2. Binary age at interview among entire sample, reference category age 50+ years; predicting low physical health functioning (n= 2,390 individuals, 7,735 observation points); low mental health functioning (n= 2,392 individuals, 7,761 observation points); high frailty index (n= 2,386 individuals, 7,664 observation points); thriving (n= 2,390 individuals, 7,740 observation points)
3. Continuous age variable among subsample age 50+ at most recent interview, predicting low physical health functioning (n= 1,119 individuals, 3,409 observation points); low mental health functioning (n= 1,121 individuals, 3,423 observation points); high frailty index (n= 1,114 individuals, 3,374 observation points); thriving (n= 1,118 individuals, 3,411 observation points).
4. Binary age at HIV diagnosis excluding perinatally infected; reference category < age 50 years predicting low physical health functioning (n= 2,351 individuals, 7,668 observation points); low mental health functioning (n= 2,353 individuals, 7,693 observation points); high frailty index (n= 2,349 individuals, 7,603 observation points); thriving (n= 2,351 individuals, 7,674 observation points).
5. Year of diagnosis, entire sample includes perinatally infected (N=38). Reference category before 1991 predicting low physical health functioning (n= 2,354 individuals, 7,671 observation points); low mental health functioning (n= 2,356 individuals, 7,696 observation points); high frailty index (n= 2,352 individuals, 7,606 observation points); thriving (n= 2,354 individuals, 7,677 observation points).
6. Number of years living with HIV, including perinatally infected (N=38) predicting low physical health functioning (n= 2,354 individuals, 7,669 observation points); low mental health functioning (n= 2,356 individuals, 7,694 observation points); high frailty index (n= 2,352 individuals, 7,604 observation points); thriving (n= 2,354 individuals, 7,675 observation points).

Functional Health Outcomes, Frailty and Thriving among Priority Populations

We examined measures of functional ability, frailty and thriving among older members of priority populations among CHAIN study participants (Figure 4). We considered Black MSM, Latino MSM, Black cisgender and Latina cisgender women. We also included Black and Latino Heterosexual men (no history of same sex behavior) since there are substantial differences on the aging outcomes between Black and Latino MSM and heterosexual men.

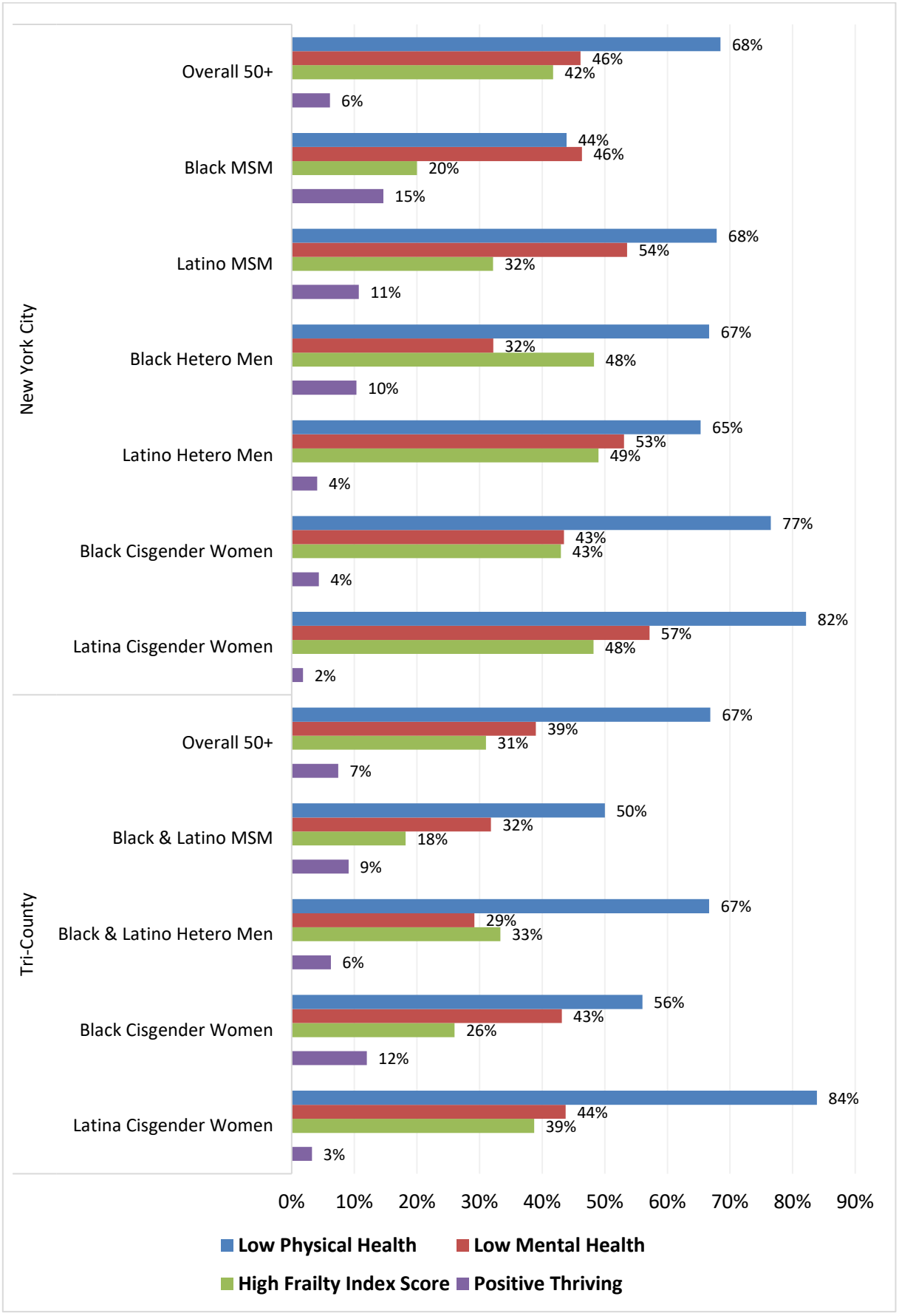
In NYC, Black MSM had much lower rates of low physical health function and frailty, as well as the highest rate of thriving compared to other PWH age 50+. Latino MSM also had relatively lower rates of frailty and higher rates of thriving. However, both Latino MSM and Latino heterosexual men were more likely than others to have low mental health functioning while Black heterosexual men had the lowest rates of low mental health functioning (32%). Both Black and Latina cisgender women had higher rates of low physical health functioning (77% and 82%, respectively) compared to all PWH age 50+ (68%). In particular, Latina cisgender women had the highest rates of low physical health, low mental health, and high frailty index score among NYC respondents.

In the Tri-County region, Black and Latino MSM had similarly lower rates of low physical health, low mental health, and high frailty index score compared to the overall sample of PWH 50+. Black and Latino heterosexual men had the lowest rates of low mental health functioning, but fared about average on measures of physical health, frailty, and thriving. As in NYC, Latina cisgender women in the Tri-County region had higher rates of low physical health, low mental health, and high frailty index score. Thriving is particularly low among Latina cisgender women in both NYC and Tri-County, at 2% and 3% respectively.

A detailed summary of the summary scores and component indicators for priority populations can be found in Appendix Tables 1 and 2.

Disaggregating by gender and ethnicity, we found that Black and Latino MSM have generally lower frailty index scores and higher rates of thriving than Black and Latino heterosexual men and cisgender women with HIV age 50+. Furthermore, Latina cisgender women in both regions are more likely than other older PWH to have low physical and mental health functioning scores, and high frailty index scores. They also have the lowest rates of thriving. These findings indicate a need to consider Latina cisgender women as a priority population in the context of HIV and aging.

Figure 4. Health Functioning, Frailty and Thriving among Priority Populations Age 50+



Risk and Protective Factors for Successful Aging

Predictors of Low Physical Health and Low Mental Health Functioning

Table 12 displays results from random effects logistic regression models examining predictors of LOW physical health functioning among PWH age 50 and above. After controlling for other factors in the model, current age, precarious housing/homelessness, stress, greater number of comorbidities, and receiving appropriate HIV medical care and social service case management are associated with higher odds of LOW physical functioning. Female gender, low education, below poverty income, HIV related discrimination, current smoking, and current as well as past problem drug use are associated with risk of low physical functioning in bivariate analyses but are not statistically significant in fully adjusted models.

Table 12 also shows results from the same logistic regression models predicting LOW mental health functioning. Life stress is the strongest predictor of low mental health functioning. Receiving HIV medical care that meets clinical practice standards is negatively associated with low or poor mental health functioning. Mental health functioning is not associated with age when other factors are controlled. At the bivariate level, current age is negatively associated with low mental health functioning, meaning that younger age is associated with lower mental health functioning. Race/ethnicity, education, HIV stigma, and smoking and drug use behaviors are associated with low mental health functioning in bivariate analyses but not when other variables are controlled.

Predictors of High Frailty Index and Thriving

Similar predictors are found for high frailty index score (Table 13). Current age, number of years living with HIV, low education, poverty, higher stress score, current problem drug use, number of comorbidities, and receipt of social service case management are associated with higher odds of high frailty index score. Latino/a ethnicity and Tri-County residence are associated with higher odds of frailty in bivariate analyses only.

Logistic analysis predicting thriving (Table 13) found no variables are positively associated with thriving in the fully adjusted model. Current age, higher stress score, number of comorbidities, and social service case management are associated with lower odds of thriving. Race/ethnicity is associated with thriving, with higher scores observed among Black and lower scores observed among Latino/as compared to White PWH; however, the relationship is not significant in adjusted models. Female gender, low education, poverty, and HIV discrimination are associated with lower odds of thriving in bivariate analyses only.

Table 12. Predictors of Low Physical & Mental Health Functioning among PWH 50+

	Low Physical Health		Low Mental Health	
	OR	AOR	OR	AOR
Age variables				
Current age	1.024	1.036*	0.966***	0.985
Number of years living with HIV	1.020	1.012	0.987	1.002
Demographics				
Gender[1]				
Female	1.662**	1.241	1.089	1.078
Transgender	0.243	0.300	1.657	2.567
Race/Ethnicity[2]				
Black	0.997	0.875	0.608***	0.816
Latino/a	1.016	0.918	1.743***	1.352
Residence[3]				
Tri-County Region	1.035	1.126	1.049	0.772
Resources/ Disadvantages				
Education[4]				
Less than HS	1.380	0.839	1.451**	1.027
More than HS	0.615*	0.632	1.731***	1.370
Household Income				
Below poverty threshold	1.462**	1.247	1.155	1.032
Housing status				
Precarious housing, homeless	1.393	1.569*	1.096	0.871
Criminal legal involvement				
Ever jail or prison	1.256	0.920	0.862	0.935
Disadvantaged Neighborhood				
Area deprivation index	1.086	1.069	0.970	0.984
Stigma, Discrimination				
HIV Enacted Stigma	3.530***	1.807	2.608***	0.888
Life stressors				
Life Stress Scale Score	1.155***	1.135***	1.302***	1.331***
Health Behaviors[5]				
Smoking				
Past	1.109	0.849	0.684*	0.932
Current	1.699*	1.148	0.878	1.030
Problem Substance Use				
Past	1.686**	1.217	0.790	0.776
Current	1.761*	1.360	1.407*	1.108
Non-HIV Comorbidities[6]				
Number of Chronic Conditions increasing mortality risk	1.484***	1.465***	1.006	0.966
Health & Supportive Services				
Appropriate HIV Medical Care				
Care meets good practice standards	1.217	1.393*	0.774**	0.739**
Case Management				
Social Services case management	1.532***	1.488***	1.161	1.090

Note: OR =odds-ratio; AOR =adjusted odds ratio * p < .05; ** p < .01; *** p < .001

Logistic regression equations using fixed effects procedure. The first model examines predictors of low physical health functioning (n=911 individuals, 2539 observations). Model 2 examines low mental health functioning (n=912 individuals, 2533 observations).

[1] Reference category male Reference category White Other/mixed.

[3] Reference category New York City.

[4] Reference category high school/ GED.

[5] Reference category never used.

[6] CVD-related conditions, diagnosed cancer, chronic respiratory disease, diabetes, liver disease (hepatitis).

Table 13. Predictors of Frailty and Thriving among PWH 50+

	High Frailty Index		Thriving	
	OR	AOR	OR	AOR
Age variables				
Current age	1.117***	1.107***	0.960*	0.950*
Number of years living with HIV	1.061***	1.031*	0.972	1.006
Demographics				
Gender[1]				
Female	1.189	0.989	0.520**	0.728
Transgender	1.350	2.487	0.390	0.453
Race/Ethnicity[2]				
Black	0.781	1.036	1.987**	2.002
Latino/a	1.466*	1.174	0.460**	0.817
Residence[3]				
Tri-County Region	0.590**	0.669	1.045	1.054
Resources/ Disadvantages				
Education[4]				
Less than HS	2.143***	1.516*	0.341***	0.619
More than HS	1.256	1.130	0.976	1.030
Household Income				
Below poverty threshold	1.505**	1.489*	0.675*	0.819
Housing status				
Precarious housing, homeless	1.252	1.354	0.970	1.039
Criminal legal involvement				
Ever jail or prison	1.158	0.793	1.042	1.424
Disadvantaged Neighborhood				
Area deprivation index	0.984	0.989	1.002	1.038
Stigma, Discrimination				
HIV Enacted Stigma	1.767	0.828	0.114***	0.331
Life stressors				
Life Stress Scale Score	1.187***	1.197***	0.698***	0.722***
Health Behaviors[5]				
Smoking				
Past	1.109	0.894	0.998	1.207
Current	0.884	0.784	0.814	1.069
Problem Substance Use				
Past	1.116	1.134	0.890	0.897
Current	1.324	1.727***	0.572	0.503
Non-HIV Comorbidities[6]				
Number of Chronic Condition increasing mortality risk	1.471***	1.385***	0.642***	0.693***
Health & Supportive Services				
Appropriate HIV Medical Care				
Care meets good practice standards	0.739**	0.791	0.827	1.210
Case Management				
Social Services case management	1.470**	1.574**	0.610**	0.624*

Note: OR =odds-ratio; AOR =adjusted odds ratio * p < .05; ** p < .01; *** p < .001

Logistic regression equations using random effects procedure to adjust for dependency among multiple observations contributed by the same individual. The first model examines predictors of risk for frailty (n= 909 individuals, 2526 observation points). Model 2 examines predictors of thriving (n=911 individuals, 2530 observation points).

[1] Reference category male Reference category White Other/mixed.

[3] Reference category New York City.

[4] Reference category high school/ GED.

[5] Reference category never used.

[6] CVD-related conditions, diagnosed cancer, chronic respiratory disease, diabetes, liver disease (hepatitis).

Summary and Discussion

The majority of older PWH in NYC and the Tri-County region live alone (67% in NYC and 60% in Tri-County). Furthermore, about a quarter of older NYC respondents and 30% of older Tri-County respondents reported that no or relatively few family members or close friends were aware of their HIV status. This may indicate HIV related disclosure concerns but also structural factors associated with aging among PWH such as loss of friends and diminished social networks, reduced income, and physical limitations reducing social involvement (Ruiz et al. 2022). Together these findings indicate that a substantial proportion of older PWA in both NYC and the Tri-County region may currently have fragile social support networks. However, the scope of this current report is limited to these two indicators; further research should investigate additional measures of social support, social isolation, and loneliness, and their effects on health outcomes and service utilization.

We also found significant physical health limitations among PWH ages 50+. Functional limitations affect ability to perform necessary daily tasks like carrying and walking, which require functional mobility and strength. Over a third of older adults reported that they are very limited in climbing several flights of stairs, and one in five reported substantial limitations in engaging in moderate activities such as carrying groceries. The effect of mobility limitations may be further challenged by transportation barriers, particularly in the Tri-County region where public transit options are few. Previous CHAIN research has found that transportation barriers are associated with missed appointments, delayed care, missed or delayed medication use, and poorer management of HIV (Aidala, Yomogida & Harned, 2019). Given the need for improved mobility services among older residents generally, New York City's Department for the Aging has piloted services such as "My Ride," a car service program which provides on-demand rides for older adults and people with disabilities. Other programs such as FreshDirect's EBT Pilot Program provide grocery delivery services for older adults on SNAP. The expansion of such programs in both NYC and Tri-County will be essential for older adults with limited mobility.

More broadly, other approaches to addressing functional limitations among older adults include the expansion of purpose-built supportive housing, provision of collective services, and proliferation of mobility, delivery, and communications technologies (Forsyth et al., 2019). In 2007, the WHO introduced the concept of "age-friendly cities" as a framework to help cities adapt its structures and services to promote opportunities for health, social participation, and security for aging residents (World Health Organization, 2007). NYC was one of 35 partner cities that participated in the development of the initiative, launching "Age-friendly NYC" (Bloomberg & Quinn, 2009). As of 2017, Age-friendly NYC encompasses 86 initiatives to support NYC's seniors including health and social services, housing, public spaces and transportation, and community and civic participation. However, evaluations of Age-friendly NYC have yet to specifically examine the impact of initiatives on mobility, social support and connectedness, and other measures of successful aging for older PWH.

With regard to measures of successful aging, our findings indicate that many older adults with HIV/AIDS experience functional limitations or disabilities that compromise their self-care and independence. 42% of NYC and 31% of Tri-County CHAIN participants aged 50 and above score high on a frailty index, an indicator of increased risk for poor health outcomes and problems with functioning independently that includes social as well as physiological and cognitive dimensions. Less than 10% of older study participants are classified as "thriving" – having adequate physical and mental health functioning and low frailty scores. Disaggregating by gender and ethnicity, we found that Black and Latino MSM have generally lower frailty index scores and higher rates of thriving than Black and Latino heterosexual men and cisgender women with HIV age 50+. Furthermore, Latina cisgender women in both regions are more likely than other older PWH to have low physical and mental health functioning scores, as well as high frailty index scores. They also have the lowest rates of thriving. These findings indicate a need for more resources targeted to older PWH outside LGBT communities. Cisgender women, especially Latina cisgender women should be considered a priority population in the context of HIV and aging.

Number of comorbidities is one of the strongest predictors of challenges to successful aging, associated with higher rates of frailty and low physical health functioning, and lower odds of thriving. The average number of non-HIV comorbidities among older NYC study participants is 4 and among older Tri-County is 2, and most have been diagnosed with one or more comorbid conditions associated with increased risk for mortality among PWH. Comorbidity issues are a major concern of CHAIN study participants. When asked to describe their biggest health concern at the present time, respondents age 50+ most commonly described one or more comorbidities as their primary concern (53%), compared to only 19% reporting any HIV-related issues. Related to having multiple health conditions in addition to HIV, two-thirds of NYC and over half of older PWH in Tri-County region reported polypharmacy—taking 5 or more medications—and the majority of them report forgetting to take their medications sometimes or often. This indicates need for adherence support, not only for ART but for self-management of multiple medication regimens as well.

These findings indicate the need to address comorbid diseases by systematically screening for prevention intervention and early diagnosis and referral. This is particularly important as multimorbidity among PWH is expected to grow over the next 10 years, and given that PWH experience earlier onset of serious comorbidities compared to their counterparts (Kasaie et al., 2021; Nanditha et al., 2019). Integrated care would moreover lower patients' burden and stress associated with navigating multiple health systems. Efforts should be implemented to increase provider ability to support aging PWH, such as thorough training to increase ability to identify comorbidities, as well as adaptation of effective referral practices such as referral tracking and referral partnership practices promoted by the CDC's Antiretroviral Treatment Access Studies (ARTAS) model (Craw et al., 2010). The AIDS Community Research Initiative of America (ACRIA) has also published recommendations for

clinicians managing older patients with HIV, and its Training Center conducts needs assessments, trainings, and technical assistance to aging service providers, healthcare providers, and peer educators on topics related to HIV and aging (Abrass et al., 2011).

We further found that successful aging among PWH in both NYC and the Tri-County region is significantly affected by a number of structural, social, economic cumulative disadvantages, more so than by individual health behaviors such as smoking or alcohol or drug use. For example, the strongest predictors of frailty are indicators of cumulative disadvantage including low education level, poverty, and life stressors. The notion of cumulative disadvantage refers to the fact that life course trajectories are influenced by earlier and accumulated inequalities. Current and previous CHAIN research has shown that income poverty, inability to pay expenses, housing and food insecurity are widespread among PWH at earlier life stages as well as among those age 50 and older (Harned et al. 2019). PWH are also disadvantaged by multiple layered stigma and discrimination associated with HIV-status, race/ethnicity, gender, sexual orientation, drug use, and/or history of incarceration. Repeated or consistent exposure to material disadvantages as well as stigma and discrimination have direct impacts on health, but operate also through chronic stress processes that affect biological development. A growing body of research has shown the effects of chronic stress on 'weathering' or the wearing down of neuroendocrine, cardiovascular and other body systems (Geronimus, 2023). Other research has shown that psychosocial stress among older PWH is negatively associated with immunological health outcomes, and that experience of stigma is a salient predictor of disease progression (Lipira et al., 2019; Rendina et al., 2019). In the current study, we found that life stress is the single strongest predictor of low mental health functioning, and significantly predicts low physical health functioning and frailty. Life stress is also negatively associated with thriving.

Healthy aging among PWH must go beyond sustained viral suppression, taking a wholistic approach to physical and mental health, wellness and quality of life. Taken together, our results provide evidence in support of the NY EMA HIV and Aging Service Directive (NY HIV Health Human Services Planning Council, 2021). Aging is a process and not a point in time. Support for aging PWH must address physical, emotional, as well as structural barriers to receiving appropriate services, prioritizing basic needs such as food and housing alongside integrated medical care, and aim to address the health disparities that widen with aging as more disabilities and chronic illnesses accumulate. Additionally, social barriers such as loneliness and physical isolation should be carefully considered among aging PWH. Continuing education for providers, among other efforts to enhance provider capacity to identify structural, personal, and implicit bias and stigma, has the potential to improve care delivery for aging adults most heavily impacted by HIV and poorer health outcomes. Finally, integrated care that includes service linkages with behavioral health and social service providers, as well as collaboration with chronic disease specialists and geriatricians increasingly will be needed (NYDOH, 2022).

There are a number of limitations to this study. Our study population is a large probability sample of individuals who had some contact with either HIV health or social services. However, PWH who go to private medical providers or may not have had need for any other supportive or social services would not be sampled for this cohort. Aging is a process, but the focus of this study primarily has been examining PWH age 50+ as a distinct service population. As an interview-based study, all of our measures are self-report. Nonetheless, standardized measures and data collection techniques were implemented to improve accuracy, and ours and prior research has established the reliability and validity of key measures.

None of these limitations diminish the strengths of the study. Despite advances in biomedical research related to aging with HIV, less research has centered on psychological, behavioral, social, and quality of life issues, increasingly recognized as important for successful aging. It is especially important to include the views and experiences of persons living with HIV, which is a strength of the current study and the overall CHAIN program of research. PWH who receive care at private doctors' offices and have no need for supportive services are not included, but what this study population does represent is a picture of the people involved in the "public" system of HIV care in NYC and the Tri-County region. Given that policymakers, providers, consumers, and advocates are generally most interested in the system of care over which they have influence, this study provides a window into the lives of PWH engaging in this system. The growing numbers of older PWH will require new models of care which are currently under development. It will clearly be worthwhile to pursue further research, especially over-time investigations, based on the findings in this study in order to better inform policy and program decision-making and to constitute the most appropriate systems of care for PWH throughout the aging process.

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Appendix

Appendix Table A1. Modified Edmonton Frailty Scale[1]

	Frailty Domain	Item	Scoring
Cognition			
	Forget things	In the past month: Did you forget things that have happened? O all the time O most of the time O some of the time O a little of the time O none of the time	1 point for each question answered at least 'some of the time' (3,4, or 5) 2 points if both at least 'some of the time'
	Difficulty reasoning	Did you have difficult reasoning and solving problems? For example, making plans, making decisions, or learning new things	
General health status			
	General health	In general, would you say your health is ... O Excellent O Very Good O Good O Fair O Poor?	"Fair" = 1 point "Poor" = 2 points
	Inpatient hospital stays	How many times have you been in the hospital overnight or longer in the last 6 months? |__|__| # times	1 times =1 point 2+ times =2 points
Functional Independence			
	Limitations bathing or dressing	Does your health now limit you in these activities: Bathing or dressing yourself O limited a lot O limited a little O not limited at all	limited a little = 1 point limited a lot = 2 points
	Limitations walking or climbing	--Climbing several flights of stairs --Walking one block	limited a lot =1 point for either limited a lot =2 points for both
	Moderate activity	Moderate activities, like moving a table, carrying groceries, or pushing a vacuum cleaner ...	limited a lot =1 point
	Home care services	In past six months: Have you received any help or assistance at home? This help could be for medical problems, for help with personal care or housekeeping, or for other services you might need at home.	received help in 1 area = 1 point received help in 2+ areas =2 points
	Residential care	Have you been a patient in a residential care facility, a nursing home or a hospice overnight or longer? O Yes O No	residential care = 2 points

Table A1. Modified Edmonton Frailty Scale (continued)[1]

	Frailty Domain	Item	Scoring
Social Support			
	Lives alone	Household composition = lives alone	lives alone =1
	No or few friends or family aware of HIV status	Some people with HIV find it difficult to reveal their status to others, even those family members or friends that they feel close to. Among those you mentioned earlier, how many of these people are aware of your HIV status?	1-2 aware = 1 point 0 aware = 2 point
Medication Use - Polypharmacy			
	Prescription drug use	We want to learn the full range of medications you are taking and how they are working for you.. Code all HIV medications currently prescribed and for non-HIV medications, condition prescribed for.	5+ prescriptions = 1 point
	Forgetting medications	How often have you missed taking your medications because you ... simply forgot O never O rarely O sometimes O Often	sometimes or often = 1 point
Depressed Mood			
	Feeling depressed	I would now like to ask you about how you have felt during the past month. For each question, tell me whether you feel this way. Have you felt downhearted and depressed… O All of the Time O Most of the Time O Some of the Time O A Little of the Time O None of the time	most or all of the time = 1 point

TOTAL SCORE ____/ 20

Note: Frailty domains and indicators based on the Edmonton Fail Scale. D.B. Rolfson, S.R. Majumdar, R.T. Tsuyuki, A. Tahir, K. Rockwood (2006). Validity and reliability of the Edmonton Frail Scale. *Age & Ageing*, 35 (5): 526-529

Appendix Table A2.

Physical Health, Mental Health, Frailty and Thriving among Priority Populations Age 50+ New York City

	Overall 50+	Black MSM	Latino MSM	Black Hetero. Men	Latino Hetero. Men	Black Cis. Women	Latino Cis. Women
Sample (N=)	424	41	28	87	49	115	56
Physical Health Functioning Summary Scale Score							
Adequate (PCS >= 50)	32%	56%	32%	33%	35%	23%	18%
Low (PCS < 50)	68%	44%	68%	67%	65%	77%	82%
Very Low (PCS < 40)	39%	22%	36%	39%	47%	39%	52%
Mental Health Functioning Summary Scale Score							
Adequate (MCS => 42)	54%	54%	46%	68%	47%	57%	43%
Low (MCS < 42)	46%	46%	54%	32%	53%	43%	57%
Very Low (MCS < 37)	26%	17%	29%	17%	33%	24%	32%
Frailty Index Score[1]							
Frailty Index (Mean, SD)	5.1 (2.2)	4.1 (1.8)	5.1 (2.3)	5.2 (2.3)	5.3 (1.9)	5.3 (2.0)	5.8 (2.5)
High Frailty Score (z-score above 1.0)	42%	20%	32%	48%	49%	43%	48%
Thriving[2]	6%	15%	11%	10%	4%	4%	2%
Components (all required)							
Frailty z-score below -0.5	11%	19%	13%	13%	5%	6%	8%
+ Adequate Physical Health Functioning[3]	32%	56%	32%	33%	35%	23%	18%
+ Adequate Mental Health Functioning[4]	54%	54%	46%	68%	47%	47%	43%

Data from most recent interview.

[1] Adapted version of Edmonton Frail Scale (Rolfson et al. 2006). Measures for some indicators within frailty domains revised based on data available and/or relevant to HIV positive population.

[2] Positive on all composite indicators.

[3] At or above mean score among U.S. general population (PCS >= 50).

[4] At or above score indicating no clinically relevant mental health symptoms (MCS => 42).

Appendix Table A3.

Functional Limitations, Frailty and Thriving among Priority Populations Age 50+Tri-County Region

	Overall 50+	Black & Latino MSM	Black & Latino Hetero. Men	Black Cis. Women	Latino Cis. Women
Sample (N=)	174	22	48	50	56
Physical Health Functioning Summary Scale Score					
Adequate (PCS >= 50)	32%	50%	33%	44%	16%
Low (PCS < 50)	67%	50%	67%	56%	84%
Very Low (PCS < 40)	38%	18%	35%	32%	52%
Mental Health Functioning Summary Scale Score					
Adequate (MCS => 42)	61%	68%	71%	57%	56%
Low (MCS < 42)	39%	32%	29%	43%	44%
Very Low (MCS < 37)	21%	14%	15%	24%	25%
Frailty Index Score[1]					
Frailty Index (Mean, SD)	4.7 (2.0)	4.0 (1.8)	4.5 (2.2)	4.7 (2.0)	4.7 (2.0)
High Frailty Score (z-score above 1.0)	31%	18%	33%	26%	39%
Thriving[2] (%)	7%	9%	6%	12%	3%
Components (all required):					
Frailty z-score below -0.5	13%	16%	20%	12%	10%
+ Adequate Physical Health Functioning[3]	32%	50%	33%	44%	16%
+ Adequate Mental Health Functioning[4]	61%	68%	71%	57%	56%

Data from most recent interview. Numbers too small to separate MSM and Hetero men by race/ethnicity.

[1] Adapted version of Edmonton Frail Scale (Rolfson et al. 2006). Measures for some indicators within frailty domains revised based on data available and/or relevant to HIV positive population.

[2] Positive on all composite indicators.

[3] At or above mean score among U.S. general population (PCS >=50).

[4] At or above score indicating no clinically relevant mental health symptoms (MCS >= 42).