


Differential Role of Psychosocial, Health Care System and Neighborhood Factors on the Retention in HIV Care of Women and Men in the Ryan White Program

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Abstract

We investigated potential differential impact of barriers to HIV care retention among women relative to men. Client intake, health assessment, service, and laboratory information among clients receiving medical case management during 2017 in the Miami-Dade County Ryan White Program (RWP) were obtained and linked to American Community Survey data by ZIP code. Cross-classified multilevel logistic regression analysis was conducted. Among 1609 women and 5330 men, 84.6% and 83.7% were retained in care. While simultaneously controlling for all demographic characteristics, vulnerable/enabling factors, and neighborhood indices in the model, younger age, being US born, not working, and having a medical provider with low volume (<10) of clients remained associated with non-retention in care among women and men; while having ≥ 3 minors in the household and being perinatally infected were additionally associated with retention only for women. Both gender-specific and gender-non-specific barriers should be considered in efforts to achieve higher retention rates.

Keywords

HIV, care retention, women

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Introduction

Women are a minority group among people living with HIV (PWH), making up about 25% of PWH in the US,¹ and their needs related to HIV care, including HIV care retention, have been understudied relative to men. While the percentage of women retained in care in the US is similar to men (58%),² women likely face different barriers to care due to demographic differences.³ For example, relative to men with HIV, women with HIV are more likely to be non-Hispanic Black or Hispanic,¹ have lower socioeconomic status,³ and have lower educational levels.³ These factors have all been associated with lower rates of HIV care engagement or adherence.⁴⁻⁹ Studies of women have found that psychosocial factors such as stigma,¹⁰⁻¹² lack of family support,¹³ and lack of transportation,^{10,14} and lack of disclosure^{10,15} were also associated with poor care engagement among women. However, the relative importance of specific barriers to HIV care retention among women compared to men has not been systematically assessed. HIV care retention is one of the steps of the HIV care

continuum, and continuous retention is essential to long-term viral suppression success.⁶ The Ryan White Program provides medical care, medical case management, and support services

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What Do We Already Know about This Topic?

In the United States, women living with HIV are more likely to belong to racial/ethnic minority groups, have lower socioeconomic status, and more competing needs such as childcare than men, potentially affecting HIV care outcomes.

How Does Your Research Contribute to the Field?

We identified that if client health care providers cared for few Ryan White Program clients, retention was lower among both men and women, but that having 3 or more minors in the household was significantly associated with lower retention only for women.

What Are Your Research's Implications toward Theory, Practice, or Policy?

Findings from our study indicate that the Ryan White Programs should assess patient retention outcomes among providers, particularly those with low volumes of clients, to identify providers in need of additional support and that the Ryan White Program should provide support for clients with childcare burdens.

to low-income PWH, serving as the provider of last resort for over half of the PWH in the US.^{16,17} This study examined people in the Part A and Part F's Minority AIDS Initiative of Miami-Dade County's Ryan White Program. Part A of the Ryan White Program provides medical and support services to counties and cities that are most severely affected by the HIV epidemic, and the Minority AIDS Initiative of Part F provides additional funding for these same services to address racial/ethnic disparities.¹⁷ The Miami-Fort Lauderdale-West Palm Beach metropolitan statistical area has the highest prevalence rate of diagnosed HIV in the US,¹⁸ and the Miami-Dade County Ryan White Program Part A and Minority AIDS Initiative, hereafter referred to as the RWP, serves about one sixth of all PWH in Miami-Dade County.^{18,19} To identify the most significant barriers to retention in the RWP among women relative to men, we conducted stratified cross-classified multilevel logistic regression analyses of RWP client intake, billing, laboratory, and neighborhood data.

Methods

Dataset/Population

Client intake, 2016 and 2017 health assessment, 2017 laboratory and 2017 service billing data files from the Miami-Dade County RWP were merged. Together these data included demographic, psychosocial, and health status factors, as well as viral load and CD4 laboratory data. To identify client needs,

health assessments are conducted twice a year by medical case managers, who enter the data through a mixture of checking boxes and entering text into text fields. During the health assessments, case managers ask clients who their HIV provider is and about the client's HIV-related symptoms, hospitalizations, medications, adherence, and any medical needs. They also ask clients about their employment, household structure, substance use, mental health symptoms, and needs related to housing, transportation, and food. Data from the first health assessment during 2017 was used. If there was no health assessment during 2017, the last health assessment from 2016 was used.

The study population included clients ≥ 18 years, enrolled in the RWP prior to January 2017, and who had received medical case management or peer services during 2017. Clients were excluded from the analysis if during 2017 they died, moved out of the county, were incarcerated, were dropped from the RWP because of no contact for at least 240 days, or became financially ineligible for the RWP. There were 6939 clients who met the inclusion criteria for the analyses.

Dependent Variable: Retention in Care

Retention in care was defined as evidence of at least 2 encounters with an HIV provider during 2017 that were at least 3 months apart, consistent with the Center for Disease Control's (CDC) definition.² Evidence included a service billed from a prescribing HIV provider or a HIV viral load or CD4 count test. About 14% of RWP clients receive the HIV care through a health insurance plan that is part of the Affordable Care Act marketplace; the RWP pays the premiums for this plan in lieu of paying providers directly. The RWP pays providers directly for the remaining clients. Because there is no service data available for clients who are in Affordable Care Act insurance plans, retention could be measured in those clients only through evidence of obtaining a HIV viral load or CD4 count test which would have been ordered by a provider. Thus, these laboratory test dates are used as a proxy for an HIV care visit consistent with how the CDC has defined retention.²

Independent, Individual-Level Variables

Our selection of independent variables was limited to those in the RWP dataset and informed by the Andersen Behavioral Model for Health Services Utilization²⁰ adapted for HIV by Christopoulos et al.²¹ and Ulett et al.²² In this framework, health service seeking behaviors are driven by demographic, vulnerable, enabling, and need characteristics as well as the health care and external environment. Our adaptation of the framework and the variables considered are in Figure 1. Race and ethnicity variables from the original dataset were combined to form 4 categories: Hispanic (of any race), Haitian, Non-Hispanic Black (NHB) (excluding Hispanic Blacks and Haitian Blacks), and Non-Hispanic White/ Other (NHW). For 18 people that reported both Haitian and Hispanic ethnicity, the category was chosen based on preferred language. If ethnicity was not consistent with preferred language ($n = 13$) (e.g. Hispanic

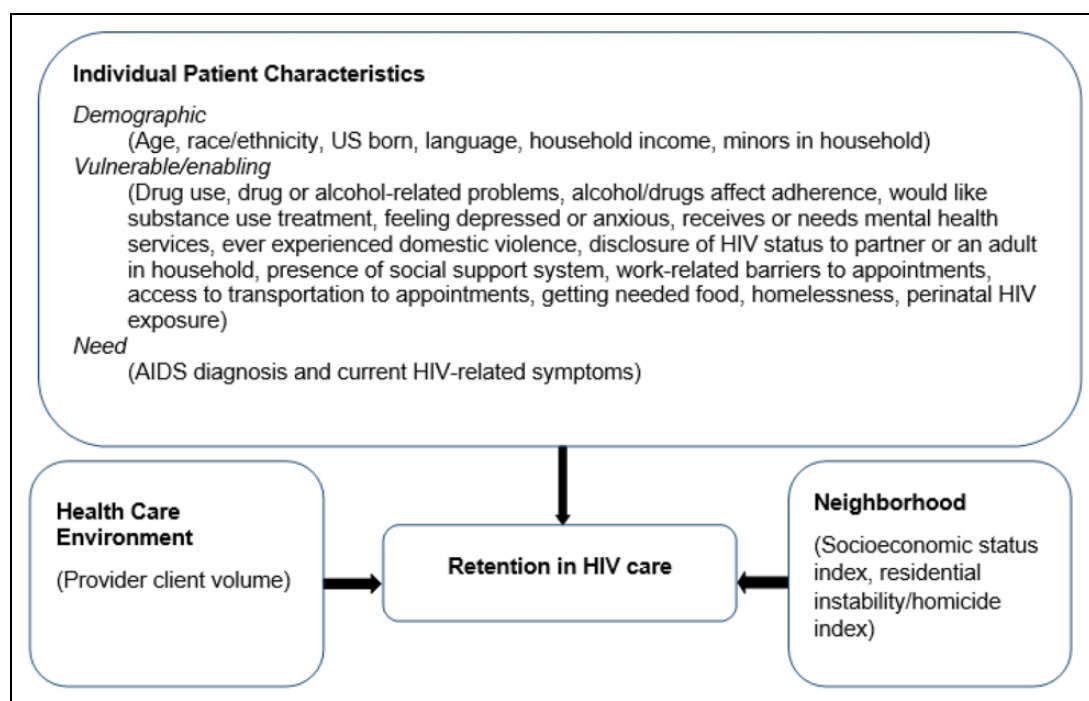


Figure 1. HIV care retention and adapted behavioral model for vulnerable populations and associated variables. Figure based on Andersen Behavioral Model for Health Services Utilization²⁰ adapted for HIV by Christopoulos et al.²¹ and Ulett et al.²²

ethnicity but Creole as preferred language), race/ethnicity was assigned based on language and country of birth. People were classified as US-born if they were born in any of the 50 states. Non US-born included people born in another country and people born in US territories. Clients were asked at the time of the health assessments and during intake the name of their HIV care provider and also the name of the provider who prescribed each of their antiretroviral medications. These names were coded. Each person in the database was assigned a provider code for the purposes of analysis based on whom they named. If multiple providers were named, the following ranking was used: 1) HIV care provider at time of the first health assessment of 2017; 2) provider named during intake; and 3) provider named who prescribed HIV medications. If the client could provide no names of their HIV provider, the provider was coded as “unknown.” The total number of RWP clients for each HIV care provider was calculated, and this number was assigned to all clients with that assigned provider.

Neighborhood-Level Indices

Five-year estimates (2013–2017) of 25 neighborhood variables were obtained from the American Community Survey (ACS)²³ for each zone improvement plan (ZIP) code tabulation area (ZCTA) (See Supplementary Table 1). The number of homicides for each ZIP code in Miami-Dade County was obtained from Simple Analytics.²⁴ Due to the large number of neighborhood variables, we created indices by first conducting a reliability analysis and selecting variables to retain based on the Cronbach’s alpha if the item was deleted. Next, we conducted

exploratory factor analysis without and with varimax rotation to select the number of factors and assess factor loadings. Variables with factor loadings <0.4 were removed.²⁵ Finally, we performed confirmatory factor analysis to calculate individual scores on each of the indices for individuals in our dataset. Scores were computed as the linear combination of the standardized values of the variables in each factor.

The Cronbach’s alpha for all 25 neighborhood variables was 0.8084. Deleting 8 variables improved the Cronbach’s alpha to 0.9386. Factor analysis revealed 2 factors: low socioeconomic status (loadings ranged between 0.45 and 0.93), and residential instability/homicide (loadings were 0.66 and 0.72). The resulting index score for each ZCTA was merged to the RWP dataset by the client’s residential ZIP code.

Analysis

The demographic, need, vulnerable/enabling variables, and neighborhood indices were compared between men and women and between those who were and were not retained in care using chi-square tests for categorical variables and Wilcoxon signed-rank test for continuous variables. Cross-classified multilevel logistic regression models (CCMM) were generated using the GLIMMIX procedure in SAS Version 9.4,²⁶ using non-retention in care as the dependent variable and all variables considered in the bivariate analysis as independent variables. The 2 cross-classified variables were residential ZIP code and medical case management sites. Unlike traditional multilevel models where individuals are nested within hierarchical groups, CCMMs allow individuals in the same level to

simultaneously belong to multiple non-hierarchical groups.²⁷ Clients in the RWP dataset could belong to the same or different medical case management site (group 1) and reside in the same or different neighborhood (group 2). Models were run separately for men and women, followed by combining records and assessing for interactions for gender with all variables that were significant in either gender-stratified model. We used listwise deletion to handle missing data due to the small number of subjects who had one or more variables with missing values: 19 (0.4%) among men and 3 (0.2%) among women. Collinearity was assessed between all variables in each of the models, and preferred language was removed from the model because it was highly correlated with race/ethnicity and US born (Spearman correlation 0.87 and 0.76 respectively) and based on the type II tolerance (<0.1).

Ethical Approval and Informed Consent

This study was approved by the Florida International University which waived the requirement for informed consent given the use of retrospective, anonymized data in this non-interventional study.

Results

Of the 6939 people in the dataset, 1609 (23.2%) were women, and 5330 (76.8%) were men. Relative to men, women were more likely to be older, NHB or Haitian, US born, have a preferred language of English or Haitian Creole, lower household income, more minors in the household, previous diagnoses with AIDS, HIV-related symptoms at the time of assessment, and live in a poor neighborhood (Table 1). However, the majority of women and men were not US born, did not have any minors in the household, had not been diagnosed with AIDS and had no HIV-related symptoms at the time of the assessment.

Of the 6939 people, 5823 (83.9%) were retained in HIV care during 2017, and there was no significant difference between women and men (84.6 vs. 83.7%; $P = .40$), (data not shown). Table 2 depicts the distribution of each variable by retention in care.

Cross-classified multilevel logistic regression models were generated using residential ZIP code and medical case management sites for men. For women, ZIP code random effects were not estimable for the full model due to the number of independent variables; therefore, the model ran as a multilevel model with medical case management group only. Demographic factors associated with non-retention in care among both men and women were younger age (women: being aged 18–34 relative to ≥ 35 , men: age groups <50 relative to ≥ 50) and being US born (Table 3). For women only, having ≥ 3 minors in the household were associated with non-retention.

None of the need characteristics were associated with retention among women. For men, having symptoms was associated with non-retention.

Regarding the vulnerable/enabling variables, not working was significantly associated with non-retention for both men and women. For women only, having been infected with HIV perinatally was significantly associated with non-retention. For men only, not getting needed food was significantly associated with non-retention.

Among both men and women, having a provider with <10 RWP patients compared with ≥ 200 was associated with non-retention. Among men only, compared with having a provider with ≥ 200 RWP patients, having a provider with 10–29 RWP patients or not knowing the provider's name was additionally associated with non-retention. There was no association between neighborhood index and retention in care either among men or women. The only statistically significant interaction term between each of the variables and gender was perinatal HIV transmission where the association between perinatal infection and lower retention was significantly stronger for women than men ($P = .03$). There was no significant interaction between race/ethnicity and US birth.

Discussion

Men and women served by the Miami-Dade County RWP are demographically different, with women being older, more likely to be NHB and Haitian, English- and Creole- speaking, US born, having minors in the household, having a lower household income, and living in a poorer neighborhood. Despite having a higher prevalence of demographic and other factors that may be barriers to care such as having symptoms of depression and anxiety and history of experiencing domestic violence, women's retention in HIV care was nearly identical to men (84.6 vs. 83.7% respectively). This is consistent with 2011 national RWP data indicating that retention in care for men and women is similar (82.9% for women and 82.0% for men).²⁸ Our data did not have measures of resiliency or other factors that may be helping women be successful in care despite increased adversity relative to men. Such factors need to be explored.

In the bivariate analysis race/ethnicity was associated with non-retention in care with the highest proportion of non-retention for women among NHW/other women and for men among NHB men. However, in the regression models, there were no statistically significant odds ratios for race/ethnicity among men or women after adjustment for other demographic, need, vulnerable/enabling, and health care environment factors. National RWP 2011 data indicated that non-retention was significantly higher among NHBs (19.3%) than NHWs (17.5%), but in that study only a limited number of demographic factors were controlled for.²⁸ In our study, NHB women had appreciably lower non-retention than NHB men (17.9% vs. 25.4%). Additionally, they had lower non-retention (17.9%) than NHW women (22.0%). Indeed, the only gender disparity was among NHWs in that women's non-retention (22.0%) was substantially higher than that of NHW men (17.1%). A study of the North American AIDS Cohort Collaboration on Research and Design (NA-ACCORD), a

Table 1. Characteristics of Clients of the Miami-Dade County Ryan White Program by Gender, 2017.

Characteristics	Total, n	Women, n (%)	Men, n (%)	P-value ^a
Total	6939	1609	5330	
Demographic characteristics				
Age group (years)				
18–34	1561	250 (15.5)	1311 (24.6)	<0.0001
35–49	2666	603 (37.5)	2063 (38.7)	
≥ 50	2712	756 (47.0)	1956 (36.7)	
Race/ethnicity				
Non-Hispanic Black	1731	668 (41.5)	1063 (19.9)	<0.0001
Hispanic	3989	486 (30.2)	3503 (65.7)	
Haitian	747	397 (24.7)	350 (6.6)	
Non-Hispanic White/Other	472	58 (3.6)	414 (7.8)	
Born in US ^b				
Yes	2311	701 (43.6)	1610 (30.2)	<0.001
No	4628	908 (56.4)	3720 (69.8)	
Preferred language				
English	3007	827 (51.4)	2180 (40.9)	<0.0001
Spanish	3217	413 (25.7)	2804 (52.6)	
Haitian Creole	626	350 (21.8)	276 (5.2)	
All other	89	19 (1.2)	70 (1.3)	
Household income, percent of Federal Poverty Level				
≥200%	1594	202 (12.6)	1392 (26.1)	<0.0001
100%–199%	2414	572 (35.6)	1842 (34.6)	
<100%	2931	835 (51.9)	2096 (39.3)	
Number of minors in household				
None	6212	1153 (71.7)	5059 (94.9)	<0.0001
1	427	248 (15.4)	179 (3.4)	
2	205	137 (8.5)	68 (1.3)	
3 or more	95	71 (4.4)	24 (0.5)	
Need characteristics				
Diagnosis of AIDS at any time				
Yes	2840	795 (49.4)	2045 (38.4)	<0.0001
No	4099	814 (50.6)	3285 (61.6)	
Has HIV-related symptoms at time of assessment				
Yes	137	42 (2.6)	95 (1.8)	0.0364
No	6802	1567 (97.4)	5235 (98.2)	
Vulnerable/enabling variables				
Drug use in the last 12 months				
Yes	531	99 (6.2)	432 (8.1)	0.0098
No	6408	1510 (93.9)	4898 (91.9)	
Drug use resulted in problems with daily activities or legal issue or hazardous situation				
Yes	163	47 (2.9)	116 (2.2)	0.0839
No	6776	1562 (97.1)	5214 (97.8)	
Drug use affects adherence				
Yes	355	57 (3.5)	298 (5.6)	0.0011
No	6584	1552 (96.5)	5032 (94.4)	
Would like substance use treatment now				
Yes	112	36 (2.2)	76 (1.4)	0.0236
No	6827	1573 (97.8)	5254 (98.6)	
Feeling depressed or anxious				
Yes	1047	289 (18.0)	758 (14.2)	0.0002
No	5890	1320 (82.0)	4570 (85.8)	
Receives or needs mental health services				
Yes	1106	310 (19.3)	796 (15.0)	<0.0001
No	5826	1299 (80.7)	4527 (85.0)	
Ever experienced domestic violence				
Yes	308	134 (8.3)	174 (3.3)	<0.0001
No	6628	1475 (91.7)	5153 (96.7)	

(continued)

Table 1. (continued)

Characteristics	Total, n	Women, n (%)	Men, n (%)	P-value ^a
Disclosure of HIV status to partner or an adult in households				
No adult in household and no partner	2605	540 (33.6)	2065 (38.7)	<0.0001
At least 1 adult in household or partner, but partner and adult do not know status	595	203 (12.6)	392 (7.4)	
Adult in household or a partner knows status	3739	866 (53.8)	2873 (53.9)	
Has a social support system to depend on				
No	1217	234 (14.5)	983 (18.5)	0.0003
Yes	5721	1375 (85.5)	4346 (81.6)	
Work-related barriers to attending care appointments				
Not working	2764	825 (51.3)	1939 (36.4)	<0.0001
No	4009	735 (45.7)	3274 (61.4)	
Yes	166	49 (3.1)	117 (2.2)	
Client has access to transportation to appointments				
No	634	127 (7.9)	507 (9.5)	0.0482
Yes	6305	1482 (92.1)	4823 (90.5)	
Client getting food he/she needs				
No	117	22 (1.3)	96 (1.8)	0.1757
Yes	6822	1588 (98.7)	5234 (98.2)	
Homeless				
Yes	378	76 (4.7)	302 (5.7)	0.1443
No	6561	1533 (95.3)	5028 (94.3)	
Infected perinatally with HIV				
Yes	49	24 (1.5)	25 (0.5)	<0.0001
No	6890	1585 (98.5)	5305 (99.5)	
Health care environment				
Number of Ryan White clients that client's clinician cares for				
1–9	209	70 (4.4)	139 (2.6)	<0.0001
10–29	245	64 (4.0)	181 (3.4)	
30–99	1371	426 (26.5)	945 (17.7)	
100–199	2046	510 (31.7)	1536 (28.8)	
≥200	2666	444 (27.6)	2222 (41.7)	
Unknown ^c	402	95 (5.9)	307 (5.8)	
Neighborhood environment				
Neighborhood low socioeconomic status (SES) index ^d				
Median		0.90	0.34	<0.0001
Interquartile range		(0.34;1.51)	(–0.21;1.34)	
Neighborhood residential instability/homicide index ^e				
Median		0.45	0.45	0.0227
Interquartile range		(–0.29;0.93)	(–0.32;1.28)	

Percentages in the table represent column percentages.

Results exclude missing values as follows: feeling depressed or anxious (n = 2), receives or needs mental health services (n = 7), experienced domestic violence (n = 3), social support needs (n = 1) and the 2 neighbor indices (n = 15).

^aChi square for P values, Wilcoxon Rank Sum test for neighborhood indices.

^bThose born in Puerto Rico or other US territories are classified as non-US born.

^cClient who could not name provider during health assessment or patient intake.

^dHigher score indicates lower SES.

^eHigher score indicates more instability and homicides.

consortium of more than 20 cohorts in the United States and Canada, found that after 5 years of entry into HIV care, NHW women had the lowest mean percentage of person-time in HIV care among all gender and racial/ethnic groups.²⁹

Compared with NHWs, Hispanics and Haitians had higher retention in care in unadjusted analyses. To assess the relationship between race/ethnicity and US birth, we compared retention by US birth status stratified by sex and race/ethnicity in a post-hoc analysis (See Supplemental Table 2). We found that for all racial/ethnic groups, retention was higher for those

non-US born than US born with differences being statistically significant for Hispanics and NHBs for men and women and Haitians among women. However, there were no significant interactions between race/ethnicity and US birth after adjusting for other variables. These findings suggest that immigrant populations in the RWP are not disadvantaged relative to US-born clients. However, these findings may not apply to other regions because Miami-Dade County has a high percentage of Hispanics (69.1%), people who do not speak English at home (73.8%), and people who are foreign-born (52.9%).³⁰

Table 2. Non-Retention in HIV Care by Characteristics for Women and Men, Miami-Dade County Ryan White Program, 2017.

Characteristics	Women (n = 1609)			Men (n = 5330)		
	Retained in care, n (%)	Not retained in care, n (%)	P-value ^a	Retained in care, n (%)	Not retained in care, n (%)	P-value ^a
Demographic characteristics						
Age						
18–34	185 (74.0)	65 (26.0)	<0.0001	1038 (79.2)	273 (20.8)	<0.0001
35–49	512 (84.9)	91 (15.1)		1738 (84.3)	325 (15.8)	
≥ 50	664 (87.8)	92 (12.2)		1686 (86.2)	270 (13.8)	
Race/ethnicity						
Non-Hispanic Black	547 (81.9)	121 (18.1)	0.0129	792 (74.5)	271 (25.5)	<0.0001
Hispanic	419 (86.2)	67 (13.8)		3029 (86.5)	474 (13.5)	
Haitian	350 (88.2)	47 (11.8)		300 (85.7)	50 (14.3)	
Non-Hispanic White/Other	45 (77.6)	13 (22.4)		341 (82.4)	73 (17.6)	
US-born						
Yes	554 (79.0)	147 (21.0)	<0.0001	1225 (76.1)	385 (23.9)	<0.0001
No	807 (89.0)	101 (11.1)		3237 (87.0)	483 (13.0)	
Preferred language						
English	665 (80.4)	162 (19.6)	<0.0001	1695 (77.8)	485 (22.3)	<0.0001
Spanish	368 (89.1)	45 (10.9)		2468 (88.0)	336 (12.0)	
Haitian Creole	312 (89.1)	38 (10.9)		242 (87.7)	34 (12.3)	
All other	16 (84.2)	3 (15.8)		57 (81.4)	13 (18.6)	
Household income, percent of Federal Poverty Level						
≥200%	171 (84.7)	31 (15.4)	0.0730	1214 (87.2)	178 (12.8)	<0.0001
100%–199%	499 (87.2)	73 (12.8)		1597 (86.7)	245 (13.3)	
<100%	691 (82.8)	144 (17.3)		1651 (78.8)	445 (21.2)	
Number of minors in household						
None	986 (85.5)	167 (14.5)	0.0174	4230 (83.6)	829 (16.4)	0.8148
1	211 (85.1)	37 (14.9)		152 (84.9)	27 (15.1)	
2	113 (82.5)	24 (17.5)		59 (86.8)	9 (13.2)	
3 or more	51 (71.8)	20 (28.2)		21 (87.5)	3 (12.5)	
Need characteristics						
Diagnosis of AIDS at any time						
Yes	663 (83.4)	132 (16.6)	0.1912	1716 (83.9)	329 (16.1)	0.7584
No	698 (85.8)	116 (14.3)		2746 (83.6)	539 (16.4)	
Has HIV-related symptoms						
Yes	31 (73.8)	11 (26.2)	0.05	60 (63.2)	35 (36.8)	<0.0001
No	1330 (84.9)	237 (15.1)		4402 (84.1)	833 (15.9)	
Vulnerable/enabling variables						
Drug use in the last 12 months						
Yes	69 (69.7)	30 (30.3)	<0.0001	307 (71.1)	125 (28.9)	<0.0001
No	1292 (85.6)	218 (14.4)		4155 (84.8)	743 (15.2)	
Drug use resulted in problems with daily activities or legal issue or hazardous situation						
Yes	28 (59.6)	19 (40.4)	<0.0001	70 (60.3)	46 (39.7)	<0.0001
No	1333 (85.3)	229 (14.7)		4392 (84.2)	822 (15.8)	
Drug use affect adherence or not						
Yes	44 (77.2)	13 (22.8)	0.1155	221 (74.2)	77 (25.8)	<0.0001
No	1317 (84.9)	235 (15.1)		4241 (84.3)	791 (15.7)	
Would like substance use treatment now						
Yes	19 (52.8)	17 (47.2)	<0.0001	41 (54.0)	35 (46.1)	<0.0001
No	1342 (85.3)	231 (14.7)		4421 (84.2)	833 (15.9)	
Feeling depressed or anxious						
Yes	239 (82.7)	50 (17.3)	0.3265	583 (76.9)	175 (23.1)	<0.0001
No	1122 (85.0)	198 (15.0)		3877 (84.8)	693 (15.2)	
Receives or needs mental health services						
Yes	252 (81.3)	58 (18.7)	0.0736	618 (77.6)	178 (22.4)	<0.0001
No	1109 (85.4)	190 (14.6)		3839 (84.8)	688 (15.2)	
Ever experienced domestic violence						
Yes	111 (82.8)	23 (17.2)	0.5577	133 (76.4)	41 (23.6)	0.0081
No	1250 (84.8)	225 (15.3)		4327 (84.0)	826 (16.0)	

(continued)

Table 2. (continued)

Characteristics	Women (n = 1609)			Men (n = 5330)		
	Retained in care, n (%)	Not retained in care, n (%)	P-value ^a	Retained in care, n (%)	Not retained in care, n (%)	P-value ^a
Disclosure of HIV status to adults in households						
No adults in household	445 (82.4)	95 (17.6)	0.1551	1713 (83.0)	352 (17.1)	0.4832
Adults in household, but none know status	178 (87.7)	25 (12.3)		329 (83.9)	63 (16.1)	
At least 1 adult in household knows status	738 (85.2)	128 (14.8)		2420 (84.2)	453 (15.8)	
Has a social support system to depend on						
No	189 (80.8)	45 (19.2)	0.0802	789 (80.3)	194 (19.7)	0.0011
Yes	1172 (85.2)	203 (14.8)		3673 (84.5)	673 (15.5)	
Work related barriers to attending care appointments						
Not working	671 (81.3)	154 (18.7)	0.0010	1479 (76.3)	460 (23.7)	<0.0001
Yes	43 (87.8)	6 (12.2)		101 (86.3)	16 (13.7)	
No	647 (88.0)	88 (12.0)		2882 (88.0)	392 (12.0)	
Client has access to transportation to appointments						
No	101 (79.5)	26 (20.5)	0.0999	398 (78.5)	109 (21.5)	0.0008
Yes	1260 (85.0)	222 (15.0)		4064 (84.3)	759 (15.7)	
Client getting food he/she needs						
No	16 (76.2)	5 (23.8)	0.2834	57 (59.4)	39 (40.6)	<0.0001
Yes	1345 (84.7)	243 (15.3)		4405 (84.2)	829 (15.8)	
Homeless						
Yes	52 (68.4)	24 (31.6)	<0.0001	207 (68.5)	95 (31.5)	<0.0001
No	1309 (85.4)	224 (14.6)		4255 (84.6)	773 (15.4)	
Infected perinatally with HIV						
Yes	12 (50.0)	12 (50.0)	<0.0001	18 (72.0)	7 (28.0)	0.1118
No	1349 (85.1)	236 (14.9)		4444 (83.8)	861 (16.2)	
Health care environment						
Number of Ryan White clients that client's clinician cares for						
1–9	48 (68.6)	22 (31.4)	<0.0001	92 (66.2)	47 (33.8)	<0.0001
10–29	56 (87.5)	8 (12.5)		140 (77.4)	41 (22.7)	
30–99	361 (84.7)	65 (15.3)		813 (86.0)	132 (14.0)	
100–199	452 (88.6)	58 (11.4)		1293 (84.2)	243 (15.8)	
≥200	375 (84.5)	69 (15.5)		1901 (85.6)	321 (14.5)	
Unknown ^c	69 (72.6)	26 (27.4)		223 (72.6)	84 (27.4)	
Neighborhood environment						
Neighborhood low socioeconomic status (SES) Index ^d						
Median	0.88	1.04	0.3170	0.34	0.47	0.0327
Interquartile range	(0.34, 1.51)	(0.33, 1.64)		(–0.21, 1.32)	(–0.21, 1.37)	
Neighborhood residential instability/homicide index ^e						
Median	0.35	0.65	0.0043	0.41	0.65	0.4094
Interquartile range	(–0.29, 0.89)	(–0.04, 1.28)		(–0.40, 1.28)	(–0.29, 1.28)	

Percentages in the table represent row percentages.

Results exclude missing values as follows: feeling depressed or anxious (n = 2), receives or needs mental health services (n = 7), experienced domestic violence (n = 3), social support needs (n = 1), and the 2 neighbor indices (n = 15).

^aP-values from chi-square. For continuous variables median and interquartile range reported, P-value from Wilcoxon rank sum.

^bThose born in Puerto Rico or other US territories are classified as non-US born.

^cClients who could not name HIV care provider during health assessment or patient intake.

^dHigher score indicates lower SES.

^eHigher score indicates more instability and homicides.

Thus, in Miami-Dade County relative to other regions in the US, non-US born and non-English speaking people tend not to be isolated, and the local health care environment is more likely to have staff who are linguistically and culturally concordant with clients.

Women were much more likely to live with a minor in the household than men (28.3% vs 5.1% respectively), (data not shown). In the logistic regression model, there was

a dose-dependent reduction in retention for women with increased number of minors in the household, although the association was only statistically significant when there were ≥3 minors in the household. This relationship was not seen in men. It was not possible to determine if these minors were cared for by the PWH or not, but the results suggest that caring for minors may be impacting retention among women. This is consistent with another study that found that having

Table 3. Adjusted Odds Ratios of Non-Retention in HIV Care Among Miami-Dade County Ryan White Program Clients, 2017, Models Stratified for Women and Men.

	Women (N = 1606)		Men (N = 5311)	
	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval
Demographic characteristics				
Age group				
18–34	1.98	(1.27–3.09)	1.86	(1.50–2.32)
35–49	1.35	(0.95–1.93)	1.42	(1.18–1.72)
≥50	Ref		Ref	
Race/Ethnicity				
Non-Hispanic Black	0.81	(0.39–1.67)	1.38	(0.99–1.91)
Hispanic	1.17	(0.53–2.60)	0.99	(0.72–1.38)
Haitian	1.01	(0.43–2.38)	1.22	(0.78–1.92)
Non-Hispanic White/Other	Ref		Ref	
US-born ^a				
Yes	2.11	(1.30–3.43)	1.34	(1.06–1.70)
No	Ref		Ref	
Household income, percent of Federal Poverty Level				
200%– >300%	Ref		Ref	
100%–199%	0.70	(0.43–1.13)	0.93	(0.75–1.16)
<100%	0.71	(0.43–1.16)	1.04	(0.82–1.31)
Number of minors in household				
None	Ref		Ref	
1	1.13	(0.73–1.73)	0.96	(0.62–1.49)
2	1.34	(0.80–2.26)	0.88	(0.43–1.81)
3 or more	2.03	(1.10–3.76)	0.56	(0.16–2.00)
Need characteristics				
Diagnosis of AIDS at any time				
Yes	1.20	(0.89–1.61)	0.98	(0.83–1.16)
No	Ref		Ref	
Has HIV-related symptoms at time of assessment				
Yes	Ref		Ref	
No	0.67	(0.30–1.47)	0.54	(0.34–0.86)
Vulnerable/enabling variables				
Drug use in the last 12 months				
Yes	1.18	(0.42–3.33)	1.22	(0.78–1.90)
No	Ref		Ref	
Drug use resulted in problems with daily activities or legal issue or hazardous situation				
Yes	1.39	(0.48–4.05)	1.27	(0.75–2.13)
No	Ref		Ref	
Drug use affects adherence				
Yes	0.77	(0.28–2.13)	0.96	(0.59–1.54)
No	Ref		Ref	
Would like substance use treatment now				
Yes	2.25	(0.91–5.54)	1.57	(0.89–2.76)
No	Ref		Ref	
Feeling depressed or anxious				
Yes	0.90	(0.58–1.39)	1.18	(0.94–1.49)
No	Ref		Ref	
Receives or needs mental health services				
Yes	0.92	(0.60–1.41)	0.93	(0.74–1.17)
No	Ref		Ref	
Ever experienced domestic violence				
Yes	0.71	(0.40–1.24)	0.97	(0.64–1.46)
No	Ref		Ref	
Disclosure of HIV status to partner or an adult in household				
Does not have a partner or adult in household	1.34	(0.97–1.84)	1.13	(0.95–1.34)
At least 1 adult in household or partner, but partner and adult do not know status	1.03	(0.63–1.67)	0.98	(0.73–1.33)
Adult in household or a partner knows status	Ref		Ref	

(continued)

Table 3. (continued)

	Women (N = 1606)		Men (N = 5311)	
	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval
Has a social support system to depend on				
No	1.13	(0.76–1.68)	1.13	(0.93–1.38)
Yes	Ref		Ref	
Work related barriers to attending care appointments				
Not working	1.72	(1.21–2.43)	1.80	(1.48–2.20)
Yes	1.13	(0.45–2.85)	1.35	(0.77–2.36)
No	Ref		Ref	
Client has access to transportation to appointments				
No	1.19	(0.71–1.99)	1.24	(0.96–1.58)
Yes	Ref		Ref	
Client getting food he/she needs				
No	1.53	(0.51–4.64)	1.98	(1.24–3.14)
Yes	Ref		Ref	
Homeless				
Yes	1.30	(0.67–2.53)	1.32	(0.98–1.78)
No	Ref		Ref	
Infected perinatally with HIV				
Yes	3.04	(1.16–7.93)	0.89	(0.35–2.26)
No	Ref		Ref	
Health care environment				
Number of Ryan White clients that client's clinician cares for				
1–9	1.91	(1.03–3.56)	2.89	(1.93–4.30)
10–29	0.63	(0.27–1.46)	1.57	(1.06–2.33)
30–99	1.10	(0.74–1.65)	1.02	(0.80–1.29)
100–199	0.66	(0.44–1.00)	1.24	(0.99–1.54)
≥200	Ref		Ref	
Unknown ^b	1.41	(0.79–2.51)	2.08	(1.52–2.85)
Neighborhood environment				
Neighborhood low socioeconomic status (SES) Index (higher score indicates lower SES) ^c	1.00	(0.82–1.23)	0.94	(0.85–1.04)
Neighborhood residential instability/homicide index ^d	1.12	(0.92–1.36)	0.98	(0.90–1.07)

The intercluster correlation coefficients were 0.047 for the same ZIP code and medical case management site, 0.016 for the same ZIP code and different medical case management site and 0.032 for a different ZIP code and same medical case management site.

Bold indicates statistically significant $P < 0.05$.

Results exclude 19 men and 3 women with missing values from one or more of the following variables: feeling depressed or anxious, receives or needs mental health services, experienced domestic violence social support needs, and neighborhood indices.

^aThose born in Puerto Rico or other US territories are classified as non-US born.

^bClients who could not name HIV care provider during health assessment or patient intake.

^cHigher score indicates lower SES.

^dHigher score indicates more instability and homicides.

≥ 2 children was associated with lower adherence to antiretroviral therapy among women.³¹

In the Andersen Behavioral Model for Health Services Utilization,²⁰ need drives health care use. However, we found that having HIV-related symptoms was associated with non-retention, and not, as expected, with retention although the association was only significant for men. It is likely that those who are not retained are not receiving antiretroviral medications and thus having a non-suppressed viral load. Thus, in this situation, having HIV-related symptoms may not be the need driving use of care but rather the effect of not seeking care.

Not working was associated with not being retained in care for both men and women. This finding may seem

counterintuitive because work competes with appointment attendance particularly for people with low paying jobs that do not offer sick leave. However, a meta-analysis found that employment was associated with a 27% increased likelihood of adherence to antiretroviral therapy,³² and 2 studies have reported a decreased likelihood of missed visits with employment.^{33,34} These findings may be confounded by factors related to employment such as education, organizational skills, self-esteem, or self-efficacy,³⁴ which may empower clients to better manage their HIV care. However, we cannot rule out that the association is at least partly due to people who are in care and virally suppressed being healthier and able to work.

For both men and women, lack of food was associated with non-retention although the association was only significant for men. While the odds ratios suggested that homelessness was associated with non-retention for both men and women, the relationship was not significant, which may be due to the relatively small number of homeless people in our dataset. Unmet housing and food needs have been reported in other studies to adversely affect HIV care outcomes.³⁵⁻³⁸ There were small numbers of people reporting these needs; yet it may be difficult to appreciably increase HIV care retention among the minority of people not yet retained without addressing these needs. No measure of substance use was associated with retention in care which is not consistent with other studies.³⁹ This may be due to the lack of validated measures of substance use that are used by the Ryan White Program system given their primary goal of identifying client service needs.

It is not clear why perinatal HIV exposure would be associated with retention in care in women but not men. Youth who were perinatally infected with HIV face special challenges to HIV care retention such as cognitive impairment, mental health problems, and treatment fatigue particularly when transitioning from pediatric to adult care.⁴⁰ A study using national surveillance data found that retention was higher among females than males who were perinatally infected (64.2% vs. 57.6%) although the percentages included people younger than 18.⁴¹ However, our results with respect to differences in retention by gender should be interpreted with caution given the small number of participants who were perinatally exposed to HIV.

Compared to having a HIV clinician who cared for ≥ 200 RWP clients, men and women cared for by a HIV clinician with < 10 RWP clients were less likely to be retained in care. Of note, we measured the number of RWP clients not HIV patients. Some of these low volume clinicians may have many HIV patients, but few RWP clients. Other studies indicate that clinical outcomes for PWH cared for by clinicians with a low volume of PWH or with less experience have worse outcomes relative to PWH cared for by clinicians with a high volume of PWH.⁴²⁻⁴⁴ These differences may be due to less experience by both the HIV health care provider and/or support staff, which may also increase the likelihood of patient-perceived HIV stigma), or to how the practices are set up or staffed. Compared with practices with fewer than 10 RWP clients, practices seeing many RWP clients are more likely to have support staff adept at dealing with the specific requirements of the RWP as well as the special needs of the clients. Clients in the RWP are free to choose the clinic site that they want to attend, and anecdotally many clients choose clinics and providers that are not near their homes because they like particular providers or the clinic sites. Thus, the high-volume providers may represent the most trusted providers. Unknown clinician (when a person doesn't know the clinician's name) was also associated with non-retention, although it was only significant for men. This may indicate a weaker relationship between the client and clinician which has been found to be associated with poorer engagement as measured by percentage of appointments kept.⁴⁵

This study is subject to several limitations. It is a secondary analysis of administrative RWP data, which were collected and entered by multiple case managers from different medical case management systems. Differences in completeness and accuracy of information may occur due to variations in case managers' interviewing skills, available time for each client, and data entry practices. Furthermore, the questions were asked to identify needed services for each patient and not for research purposes; thus, validated scales were not used. Finally, some variables were based on information that clients may be reluctant to share. Thus, it is likely that substance use and history of intimate partner violence were underreported. Furthermore, we had no information about stigma and little detail about family and social support—factors associated with retention in other studies.^{10,13,33,46} An additional limitation is that our analysis is restricted to clients who are engaged in care in that we only included people who had a health assessment. Thus, our results apply to people who have been linked to care and had at least one contact with the Ryan White Program. Furthermore, our analysis excluded clients who left the program for various reasons. Some of these reasons such as financial ineligibility (i.e. income increased) and extended incarceration (due to care provided in prison) would likely be associated with better retention, while others such as being dropped from the RWP because of no contact for at least 240 days may be associated with worse retention. The Ryan White Program data system is at the county level and does not allow for data linkages between counties within Florida or within states. Therefore, while some of those with no contact may be out of care, some also may be served by Ryan White Programs in neighboring counties. These limitations may be affecting the measured overall retention rate, but it is not clear or how they would be affecting the specific barriers that were identified or any differences between men and women. The neighborhood analysis was limited in that the geographic unit available for analysis was the ZIP code. An analysis by census tract would have allowed for a more precise characterization of the neighborhood. Finally, it was not possible to analyze client volume by providers in more depth with service data because service billing data was only available for clients who were not enrolled in Affordable Care Act insurance plans and the data frequently listed the provider as a site and not as a specific health care professional. Additionally, because of the limitations of the data, it was not possible to use additional retention measures such as missed visits or visit adherence. However, the retention measure we used has been found to have good prognostic value for viral suppression.⁴⁷

Conclusions

Despite women living with HIV being generally more socio-economically disadvantaged than men, HIV care retention was similar for men and women. For men and women, having a clinician who cares for few RWP patients appears to adversely affect care retention, suggesting the need to examine how such clinicians can be supported to better serve RWP clients. For

example, RWPs could share best practices from highly experienced RWP providers with those providers with less RWP experience. Overall, 16% of enrolled clients were not retained in care; to reduce this number, addressing some of the identified problems such as lack of employment, food insecurity, and substance use will be needed. For women, being perinatally infected with HIV and caring for children appear to be additional barriers that need further examination.

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Supplemental Material

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