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An exploratory study to assess individual and structural level barriers associated with poor retention and re-engagement in care among persons living with HIV/AIDS

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Abstract

Background—Retention in care is the most challenging step along the HIV care continuum.

Many patients who engage in care and achieve viral suppression have care interruptions, characterized by moving in and out of care (“churn”). Poor retention has clinical consequences and contributes to new HIV transmissions, but how to predict or prevent it remains elusive. This study sought to understand the relationship between individual- and structural-level barriers, and poor retention for persons living with HIV/AIDS in Atlanta, Georgia.

Methods—We administered a survey, through interviews, with HIV-infected patients continuously retained in care for 6 years (“continuously retained,” n = 32) and patients with recent

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gaps in care (“unretained” $n = 27$). We assessed individual-level protective factors for successful engagement (self-efficacy, resilience, perceived social support, and disclosure), risk factors for poor engagement (substance use, mental illness, and stigma), and structural/systemic-level barriers (financial and housing instability, transportation, food insecurity, communication barriers, incarceration history). Chi-square and Mann-Whitney U tests were used to compare the two populations.

Results—Both continuously retained and unretained populations had high rates of prior viral suppression but few unretained patients were virologically suppressed upon return to care (11%). Younger age, crack cocaine use, food insecurity, financial instability, housing instability and phone number changes in the past year were significantly more likely to be present in the unretained population.

Conclusion—Our findings suggest the need for targeted risk assessment tools to predict the highest risk patients for poor retention whereby public health interventions can be directed to those individuals.

Keywords

HIV/AIDS; Retention; Barriers to Care; Re-engagement in care

INTRODUCTION

Retention in care for persons living with HIV/AIDS (PLWHA) is associated with higher rates of antiretroviral prescribing, higher rates of viral suppression (VS), fewer AIDS-defining illnesses, fewer hospitalizations and lower mortality [1–4]. Despite the evidence that retention is associated with positive HIV disease specific outcomes, retention is the step of the HIV care continuum where the largest drop-off occurs [5, 6]. Even among patients who meet standard definitions of retention in care at a single point in time, maintaining that retention over time remains a challenge [7–9]. In addition, progression along the HIV care continuum can be neither linear nor stable and patients may cycle in and out of care, a phenomenon referred to as “churn” [10–12].

Not only does poor retention pose disease progression risks to the individual patient, but also a public health risk of HIV transmission, as it is estimated that greater than 60% of new HIV transmissions stem from out of care populations [13]. Furthermore, the community viral load (CVL) is disproportionately influenced by the churning population. For example, a study in Alberta, Canada found that, upon returning to care, those in churn accounted for 16.6% of the CVL but only 4.9% of the total study population whereas 78.7% of the population was continuously retained and only accounted for 29.5% of the CVL [12].

Data from large HIV cohorts and national estimates consistently identify risk factors for poor retention such as younger age, African American race, female gender and substance abuse [10, 14]. For clinics that serve a disproportionate number of youth, African Americans, women and substance users, these predictors of poor retention do little to guide resource utilization. To better understand potential predictors of poor retention, we conducted a retrospective case-control study with patients, in Atlanta, who were poorly

retained and re-entering care and those who were continuously retained for 6 years. This study was conducted at one of the largest HIV clinics, in the southeastern United States, serving socioeconomically vulnerable and predominantly minority patients.

METHODS

Participants and Design

Participants were recruited from the Grady Health System Infectious Disease Program (IDP) in Atlanta, Georgia. Study participants were HIV-infected adults eligible for IDP services and either actively engaged in care or enrolling/re-enrolling in care at IDP at the time of recruitment. The IDP is an urban Ryan White HIV/AIDS Program (RWHAP) funded clinic serving over 5800 un- or underinsured patients who are predominantly African-American and economically disadvantaged. The vast majority of IDP patients carry an AIDS diagnosis and those who do not have an AIDS diagnosis are either ≥ 24 years of age, pregnant, severely mentally ill, have a substance abuse disorder or have complicating medical co-morbidities requiring subspecialty care within the Grady Health System. The recruited sample was similar to the general IDP population in terms of age, gender and race.

Based on the Institute of Medicine definition of retention, *continuously retained* patients were defined as having attended two scheduled HIV provider visits in a 12-month period, separated by ≤ 90 days in the years 2010–2015 (not including walk-in visits), thus being retained for at least 6 years [28]. The *unretained* patients were defined as having attended at least one HIV primary care visit (either at IDP or another clinic) with a gap of at least seven months since their last HIV primary care visit, and meeting one of the following criteria: ART gap of at least 3 months, only a single re-enrollment visit in the 12 months prior to their current gap in care, or had history of prior gaps in treatment of at least 12 months since their initial engagement in care.

Procedures

In order to recruit the continuously retained group, a previous cohort of continuously retained patients (2010–2012) (n=321) was reviewed for ongoing retention in care during 2013, 2014 and 2015. Patients who were continuously retained were contacted and offered participation by phone, using convenience sampling based on upcoming scheduled provider visits. In order to recruit unretained participants, flyers were placed on bulletin boards in areas where patients enroll in clinic. Staff who enroll patients in care were encouraged to refer potential participants to the research assistant for eligibility assessment. Additionally, active surveillance of the upcoming scheduled provider visits after re-enrolling was reviewed daily by the research assistant and potential participants were called prior to their visit or approached on the day of their visit to offer participation in the study. Potential participants who agreed to participate were asked a series of screening questions to confirm eligibility and if those were met, informed consent was obtained and interviews were conducted. The survey tool was administered aloud by the research assistant. Participants were provided a \$10 incentive for their participation in the study.

All study procedures were approved by Emory University Institutional Review Board (IRB006877) and the Grady Research Oversight Committee.

Materials

In order to determine individual and systemic/structural factors associated with poor retention in care, the survey tool contained patient self-reported demographic information, including date and place of birth, primary language, gender, sexual orientation, race/ethnicity, educational attainment, primary residence address, year of initial HIV diagnosis, year of ART initiation (if prescribed) and medication adherence. The survey measured self-efficacy (The General Self-Efficacy Scale, GSE) [29], perceived social support (Multidimensional Scale of Perceived Social Support) [30], resilience (Connor-Davidson Resilience Scale, two item; CD-RISC-2) [31], *The NIDA Quick Screen* (for substance abuse), alcohol abuse (the alcohol use disorder identification test; AUDIT-C) [32], depression (Patient Health Questionnaire; PHQ-9) [33], internalized AIDS stigma[34], treatment stigma[35], unmet needs (mental health treatment, substance abuse treatment, housing, financial assistance, benefits, food, transportation), transportation (mode, distance, time), financial information (income, benefits, financial stability), food insecurity[36], housing stability and health insurance status.

Medical record abstraction supplemented self-reported demographic data with clinical data contained in the electronic medical record (EMR). The most recent (in relation to time of interview) HIV-1 RNA level was abstracted and recorded in database as copies/mL. All values which were undetectable or < 40 copies/mL were recorded in the database as 40 copies/mL for purposes of calculating median VL. We used a cutoff of < 200 copies/mL to classify participants as virologically suppressed for the analysis. All HIV-1 RNA levels in the medical record were reviewed to document whether the patient was ever virologically suppressed, based on a cutoff of <200 copies/mL. This was recorded as a binary variable (yes/no). CD4 counts were recorded as cells/ μ L. Google Maps® (<http://maps.google.com>) was used to calculate travel distance to clinic, and the WalkScore website® (<http://walkscore.com>) was used to review TransitScore® in patients' neighborhoods.

Statistical Analysis

The baseline characteristics of potentially contributory variables were stratified by the retention status of participants. Categorical and ordinal variables were evaluated using Pearson's Chi-Square tests and Fischer's Exact tests where appropriate. For continuous variables where the assumption of normality was met, means were compared using the Student's t-test and, if normality was not met, Mann-Whitney U Tests were used. In many circumstances, ordinal variables were simplified into binary variables and differences between the continuously retained and unretained populations were assessed. IBM SPSS Statistics ® (Version 2) was used for statistical analyses; all tests were two-tailed, and statistical significance was measured at $p < 0.05$, with specific p values noted.

RESULTS

Sample Characteristics

The study sample consisted of 59 participants; 32 were classified as continuously retained, 27 were classified as unretained, and 4 were excluded (due to screening failures). Participant characteristics by continuously retained and unretained status are shown in Table 1. The mean age was 46.6 (± 9.5) years old with 19 (32%) women, 52 (88%) African Americans and 18 (31%) who self-reported as gay/MSM/bisexual. Seventeen (29%) attained at least a high school degree (or equivalent) and 5 (8%) completed a Bachelor's degree or higher. The unretained patients were younger, on average, compared to the continuously retained population (48.9 ± 8.8 vs 43.7 ± 9.5 ; $p = 0.03$) but the two groups did not differ in other demographic factors. The groups differed by payer source with 72% of the continuously retained population having Medicare/Medicaid and 63% of the unretained population having Ryan White coverage at the time of the interview ($p = 0.006$). Unretained participants had a lower average monthly income ($\$537 \pm 506$ vs. $\$1083 \pm 833$, $p = 0.004$) and were more likely to have zero income at the time of interview (33% vs. 6.3%, $p = 0.016$). Participants received an HIV diagnosis, on average, 13.4 (± 8.0) years previously and initiated ART, on average, 11 years before the study (± 6.8). The unretained participants were out of care for an average of 17 months (SD 10.9) and off ART for an average of 11.7 months (± 9.3). At the time of the interview, all of the continuously retained patients self-reported taking ART and two (7.4%) of the unretained patients self-reported taking ART. Only one unretained patient was on ART throughout the time he was out of care. Twenty-seven (84.4%) of the retained patients were virologically suppressed (VL < 200 copies/ml) at the time of the interview. The majority of participants (52 or 88%) achieved viral suppression (< 200 copies/mL) at some time during the course of their infection. Median CD4 counts were higher among continuously retained participants (463 cells/ μ L; IQR 331, 565) than those who were unretained (101 cells/ μ L; IQR 29, 187) ($p < 0.001$).

Potential Barriers and Facilitators for Retention

Individual barriers—Individual level barriers/facilitators are shown in Table 2. The continuously retained and unretained participants did not differ in mean self-efficacy score or mean resilience score. Seventy-two percent of the retained participants had “high-levels” (mean score of > 5 on a 7-point Likert scale) of social support compared to 33% of the unretained population ($\chi^2 8.76$, $p = 0.003$). Fewer than half of the unretained participants reported that they had disclosed their HIV status to *all* or *most* of their family, compared with 78% of continuously retained participants who disclosed to *all* or *most* of their family ($\chi^2 7.10$, $p = 0.008$). The two groups did not differ on patterns of disclosure to friends. There were no statistically significant differences in overall measures of stigma. Among continuously retained participants, 9% agree with the statement, “*It is hard to take my HIV medication because it reminds me I have HIV*” compared with 41% of the unretained participants ($\chi^2 7.96$, $p = 0.006$).

Self-report of past or present mental health diagnoses did not differ significantly between the continuously retained (44%) and unretained groups (41%). Based on PHQ-9 screening there was a trend towards higher prevalence of depression in the unretained group (12.5% vs.

33.3%, $p = 0.054$). A higher proportion of the unretained participants reported *any alcohol or drug use* in the prior year (92.6% vs. 50.0%, $\chi^2 12.53$, $p < 0.001$) as well as daily (44.4% vs. 15.6%, $\chi^2 5.93$, $p = 0.015$). The rate of marijuana use in the past year did not differ between the unretained (25%) and continuously retained (29.6%) but crack/cocaine use was five times more common in the unretained group (44.4% vs. 9.4%, $\chi^2 9.50$, $p = 0.003$). Of those who had a positive screen with the *NIDA quick screen* tool, the unretained participants were equally as likely as continuously retained participants to either have used more than they intended (52.0% vs. 62.5%) or felt the need to cut down on their substance use (76.0% vs. 62.5%). The unretained population was more likely to miss paying a bill due to substance use (40.0% vs. 6.3%, $\chi^2 5.66$, $p = 0.02$).

Systemic barriers—Systemic level barriers are reported in Table 3. Unretained participants reported having more unmet needs (2.93 ± 2.32) than continuously retained participants (1.37 ± 1.81) ($p = 0.008$). Unretained participants were more likely to report running out of money for basic necessities such as housing or food (92.6% vs. 46.9%, $\chi^2 14.01$, $p < 0.001$). Four unretained participants were homeless (14.8%) compared to none in the continuously retained group and 6 (22.2%) unretained participants reported staying rent-free with friends, family, or a significant other compared with 1 (3.1%) in the continuously retained group ($p = 0.001$). More continuously retained participants considered their housing situation to be stable compared with unretained participants (88% vs 48%, $\chi^2 8.80$, $p = 0.003$). A higher proportion of unretained participants had been in jail during their lifetime (92.6% vs. 71.9%) and within the past year (25.9% vs. 6.3%) but the differences were non-significant. Unretained participants were more likely to report food insecurity (40.7% vs. 9.4%, $\chi^2 7.96$, $p = 0.006$) and unmet food/grocery needs (55.6% vs. 21.9%, $\chi^2 7.10$, $p = 0.008$). Continuously retained and unretained participants reported similar methods of coming to clinic, with 40.7% primarily relying upon the Atlanta public transit system, 25.4% driving their own car to clinic, 15.3% using Medicaid or public transit vans, and 10.2% borrowing a car or getting a ride. Notably only 20.4% of participants lived in an area with “excellent” or “good” public transit access; 39.0% lived in an area with some public transit access, and 40.7% lived in an area with minimal transit options, with no significant differences between continuously retained and unretained participants. Continuously retained and unretained participants reported similar travel distances (9.3 miles ± 5.1 vs. 9.5 miles ± 6.9) and transport times (37.7 minutes ± 26.1 vs. 43.5 ± 25.2). More unretained participants reported having unmet transportation needs (44.4% vs. 21.9%), but differences did not meet significance. Over 90% of all participants had a mobile phone with no difference between the continuously retained and unretained groups. A similar proportion of unretained (29.6%) and continuously retained (25.0%) participants reported difficulty keeping minutes on their phones. Sixty-six percent of unretained participants had a phone number change in the past year compared with 31% of continuously retained participants ($\chi^2 7.37$, $p = 0.007$). On average, unretained participants also had more instances of phone number changes during the previous year (0.38 ± 0.91 vs. 1.46 ± 1.58 , $p = 0.001$).

DISCUSSION

This study compared patient characteristics between continuously retained and unretained PLWHA in Atlanta, Georgia. Comparative analyses explored individual and systemic level barriers and facilitators to care engagement. This study supports the notion that success along the care continuum cannot be marked by achievement of viral suppression alone, as most of the unretained patients had previously achieved virologic suppression but at the time of returning to care few remained virologically suppressed [7]. Furthermore, these churning populations have been shown to contribute significantly to the community viral load [37], which may have implications for ongoing HIV transmission in the community [38]. This study contributes to the growing evidence base for barriers to retention, both at an individual and systemic-level. The differences in the CD4 counts between the unretained and continuously retained groups provide further support for the detrimental consequences of poor retention [3].

Increasing evidence demonstrates individual level poverty is a driver of the racial mortality differences in Medicare populations [39]. This study demonstrates that even among the poor, a lower monthly income is associated with poor retention in care, which supports findings from a cohort in Alabama where higher income patients had more success along the care continuum [40]. Furthermore, these data suggest that beyond absolute income, the stability of that income may be important with more participants in the retained group receiving income through SSI, a reliable source of monthly income. Related to basic needs being met, the unretained population had higher rates of unmet needs related to food and instability in being able to pay for rent or food. Similar to income, the ability to meet these needs on a regular basis must be considered as this may fluctuate based on time of month and available resources. More broadly, this may be a marker of chaos in life, which has been correlated with poor retention and VS outcomes [27].

Another potential marker for life chaos is cell phone reliability. That unretained populations were more likely to have phone number changes has important implications for thinking about interventions to improve retention or facilitate re-engagement in care. Many retention programs rely on making phone contact or sending certified letters, yet the current data suggest that the group most needing these interventions may not have consistent phone numbers or addresses. This suggests more intensive, potentially “on-the-ground” outreach may be necessary on a regular basis to re-engage and continuously retain patients [41]. The recent CTN0049 randomized controlled trial evaluating patient navigator and contingency management interventions to improve retention focused on poorly retained substance users and used intensive outreach efforts [42]. Although the primary endpoint was non-significant, 94% of those who were not deceased at 12 months did have a follow-up VL. Furthermore, at 6 months while the intervention was ongoing 75% participants in the patient navigation + contingency management arm had a visit with an HIV provider. This demonstrates that intensive outreach can have a profound effect on tracking traditionally very difficult to retain populations and raises hope that novel modes of ART delivery (e.g. long acting injectable therapy) may be feasible. Because the “on-the-ground” approach is resource intensive and will only be available to small pools of patients, other mechanisms to rapidly re-engage patients in care must be employed. For instance, a health information exchange to identify

patients who are out of care but making contact with another aspect of the health care system (e.g. Emergency Department) has been shown to be effective in Louisiana [43]. A similar system is currently being piloted with the Grady Health System Emergency Department and IDP.

The negative effects of crack-cocaine use on the steps of the HIV care continuum are well described. The current results provide further support for the negative impact of crack use on retention in care [23, 44]. The lack of efficacious treatment options for crack-cocaine use disorder make this a particularly challenging problem to address. Novel approaches to retention in care for crack users are needed. Potential models include making care more accessible through lenient appointment schedules, delivering care to patients in their homes or the street and targeting adherence with long acting antiretrovirals. The latter approach has some precedent with long acting antipsychotics in the treatment of schizophrenia [45]. We did not find any difference in depression scores with poor retention, as was demonstrated by Wawrzyniak et al., but this may be secondary to co-located mental health services in the clinic where this study was conducted [27].

Levels of social support from friends and family differed significantly between continuously and unretained patients yet were equivalent with regard to support from a significant other. The role that social support plays across the care continuum differs by step of the care continuum with poor social support seeming to adversely affect linkage and ART adherence but not affect retention in care [25, 27]. The mixed results in the literature around social support emphasize the need for larger, better designed studies to address the question of effect of social support on care continuum outcomes, particularly since poor social support may be a modifiable risk factor through community engagement and peer support programs. Disclosure of HIV status, particularly to a family member, was higher in the continuously retained population, consistent with recent findings that disclosure on some level seems to be an important predictor of retention. In a recent publication complete non-disclosure was an important predictor of poor retention [46]. Initial intake surveys should include questions around disclosure. For patients who have not disclosed to any family members we can encourage this disclosure and even offer assistance and support during the act of disclosure. Finally, in the current study there were no differences in resilience and self-efficacy scores between the continuously retained and unretained population whereas in previous publications there have been associations demonstrated between resilience and adherence to ART [47]. It will be important to explore each of these domains further in larger prospective studies in order to gain a better understanding of their influence on retention in care, particularly since it is conceivable that these could be modifiable risk factors through various levels of peer support.

It is increasingly apparent that we need “early warning indicators” to help predict which patients, upon engaging in care, have the highest risk of poor continuous retention. This would facilitate optimal utilization of the limited resources available for intensive and individualized retention efforts. As an initial response to the data generated from this study, at IDP we are reviewing our current local eligible metropolitan area (EMA) case management screening tool to assess how this can be used more effectively to link patients to support services that may be available. The IDP is currently working to increase

utilization and effectiveness of case management by making these services available to patients prior to their initial provider visit. Furthermore, we are exploring how questions that address domains identified in the current analysis could be incorporated into a short screening tool. Ideally, a simple screening tool could differentiate those with highest risk of poor retention and also inform the most appropriate interventions. As noted in the current study, some factors that may be very important for predicting poor retention may be markers of an erratic and chaotic lifestyle which can hamper retention interventions when missed appointments occur. Interventions will need to be nimble and able to adapt to changing needs of the patients such that coming lapses in retention are anticipated and prevented. This may mean resource intensive interventions for the most difficult to retain groups. Recent modeling suggests that investing in retention may ultimately be cost-effective because of the implications for decreasing new infections and mortality [48].

Limitations

A primary limitation of the current study was the small sample size making it difficult to assess the potential additive or syndemic effects each of the individual risk factors may have on retention. In addition, there may have been selection bias in the unretained group, many of whom were identified at the time of re-engagement in care. These patients may differ from those entirely lost to follow-up and not re-engaging in care on their own. Furthermore, we did not track participants who refused to participate so those who consented to complete the interview/survey may have been different than those who elected not to participate. The continuously retained group was retained in care for six years, so may differ from populations considered retained by current IOM or DHHS definitions being that these definitions focus on 12- and 24-month time periods. The study did retrospectively measure barriers to retention with potential for changes over time, though most of these barriers endure over time. Furthermore some measures required recall (such as, substance use in prior 12 months) which may have introduced recall bias. Finally, the generalizability of study findings is limited by the fact that it was conducted in a single outpatient clinic and not across a range of clinical settings.

Conclusions

In conclusion, clinics that serve vulnerable populations would benefit from screening tools that better predict individuals at risk for poor retention or churn given the limited resources to deploy intensive, clinic-wide outreach and retention efforts. This exploratory study suggests that additional factors which could be determined at clinic entry may help distinguish this population when traditional risk factors for poor retention are common. In this study, younger age, crack cocaine use in the past year, food insecurity, financial instability, housing instability and phone number changes in the past year were more likely to be present in the unretained population. Continuously retained populations were more likely to report high levels of social support and disclosure of HIV status to family. These findings emphasize the heterogeneity of barriers to retention and highlight opportunities to improve retention. Earlier identification of the highest risk patients in order to link to existing support services will be critical. Novel interventions to deliver care in a more flexible environment than the standard healthcare setting are needed. Perhaps most importantly, we must recognize the local variability in retention challenges, and develop

local, data-driven, responses to address individual patient needs through a personalized public-health approach.

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Table 1

Participant Characteristics (n = 59)

Characteristics	Continuously Retained (n=32)	Unretained (n=27)
Basic Demographics		
Age, mean $\pm$ SD, yrs	48.9 $\pm$ 8.8	43.7 $\pm$ 9.5 *
Birth sex, male, n (%)	19 (59.4)	21 (77.8)
Race / Ethnicity, n (%)		
African American	27 (74.4)	25 (92.6)
Non-African American	5 (15.6)	2 (7.4)
Sexual Orientation ^a , n (%)		
Homosexual	5 (15.6)	10 (37)
Heterosexual	23 (71.9)	16 (59.3)
Bisexual	2 (6.3)	1 (3.7)
Socioeconomic		
Education, n (%)		
Less than HS/GED	11 (34.4)	6 (22.2)
HS/GED	9 (28.1)	14 (51.8)
Any College	8 (25)	6 (22.2)
Bachelor or higher	4 (12.5)	1 (3.7)
Any Income	30 (93.8)	18 (66.7) **
Monthly Income, mean $\pm$ SD	\$1083 $\pm$ \$833	\$537 $\pm$ \$506 **
Social Security (SSI or SSDI), n (%)	24 (75)	10 (37.0) **
Food stamps, n (%)	7 (21.9)	11 (40.7)
Biomedical		
Years since HIV diagnosis, mean $\pm$ SD	13.4 $\pm$ 7.8	13.3 $\pm$ 8.3
Years since ART initiation, mean $\pm$ SD	11.2 $\pm$ 6.9	10.3 $\pm$ 6.8
ART Status, n (%)		
Currently on ART	32 (100)	2 (7.4) ***
Previously on ART, not currently	0 (0)	24 (88.9) ***
ART naïve	0 (0)	1 (3.8)
Viral Suppression (<200 copies/mL) [‡] , n (%)	27 (84.4)	3 (11.1) ***
Ever virologically suppressed, n (%)	31 (96.8)	21 (77.7) *
Viral load (copies/mL), median (IQR)	40 (40, 50)	42,230 (3428, 153139) ***
CD4 Count (cells/ μ L) [‡] , median (IQR)	463 (331, 565)	101 (29, 187) ***
Payer Source **		
Medicaid / Medicare	23 (71.9)	9 (33.3)
Ryan White/No coverage	7 (21.9)	17 (63)

Characteristics	Continuously Retained (n=32)	Unretained (n=27)
Private	2 (6.3)	1 (3.7)

* $P < 0.05$,

** $P < 0.01$,

*** $P < 0.001$;

^aTwo subjects in retained group refused to answer;

[‡]this is VL and CD4 count closest to the time of interview (for those out of care, these were most often upon returning to care).

Table 2

Individual barriers & facilitators by retention status

	Continuously Retained (n = 32)	Unretained (n = 27)
Substance use, n (%)		
Positive Screen (use in last 12 months)	16 (50.0)	25 (92.7) ***
Alcohol	4 (12.5)	2 (7.4)
Marijuana only	8 (25.0)	8 (29.6)
Crack/cocaine	3 (9.4)	12 (44.4) **
Multiple	1 (3.1)	3 (11.1)
Missed bill payment due to substance use (Yes)	1 (6.3)	10 (40) *
Mental health		
Positive screen for depression PHQ-9	4 (12.5)	9 (33.3)
Self-Efficacy, mean±SD	3.18 ± 0.69	3.22 ± 0.48
Social Support, n (%)		
Perceived Social Support (total), mean±SD	5.47 ± 1.36	4.67 ± 1.26 **
High (>5)	23 (71.9)	9 (33.0) **
Moderate (3–5)	6 (18.8)	15 (55.6)
Low (<3)	3 (9.4)	3 (11.4)
Perceived Social Support by subscales, mean±SD		
Friends	5.18 ± 1.63	4.25 ± 1.76 *
Family	5.68 ± 1.66	4.57 ± 1.87 *
I get the emotional help and support I need from my family (Agree), n (%)	27 (84.4)	15 (55.6) *
Significant other	5.52 ± 1.49	5.19 ± 1.39
Resilience, mean±SD	8.03 ± 1.84	8.31 ± 1.32
Disclosure, n (%)		
Does your family know about your HIV status? (All or Most)	25 (78.1)	12 (37.5) **
Do your friends know about your HIV status? (All or Most)	12 (37.5)	9 (33.3)
Stigma		
Internalized AIDS Treatment Stigma, mean±SD	0.353 ± 0.334	0.470 ± 0.264
I am ashamed that I am HIV positive (Disagree), n (%)	22 (68.8)	12 (44.4)
Treatment Stigma Scale, mean±SD	0.146 ± 0.235	0.247 ± 0.267
It is hard to take my HIV medication because it reminds me that I have HIV (Agree), n (%)	3 (9.3)	11 (40.7) **

* $P < 0.05$,** $P < 0.01$,

 $P < 0.001$.

Means compared using the Mann-Whitney U test; proportions compares using a χ^2 test or Fischer exact test.

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Table 3

Structural/Systemic level barriers/facilitators of retention

	Continuously Retained (n = 32)	Unretained (n = 27)
Unmet needs, mean±SD	1.37 ± 1.81	2.93 ± 2.32 **
Mental health treatment, n (%)	4 (12.5)	7 (25.9)
Substance abuse treatment	2 (6.3)	5 (18.5)
Housing	8 (25.0)	12 (44.4)
Financial assistance	9 (28.1)	14 (55.6) *
Benefits	10 (31.3)	13 (48.1)
Food/groceries	7 (21.9)	15 (55.6) **
Transportation	7 (21.9)	12 (44.4)
Employment Status (Any work), n (%)	8 (25.0)	12 (44.4)
Financial Instability, n (%)		
Do you have trouble paying rent on time? (Never)	26 (81.3)	10 (37) ***
Do you have trouble paying other bills on time? (Never)	20 (62.5)	9 (33.3) *
How often do you run out of money for basic necessities like housing or food? (Never)	17 (53.1)	2 (7.4) ***
Housing, (%)		
Do you know where you're going to sleep each night? (Always)	30 (93.8)	19 (70.4) *
Is your housing situation stable? ‡ (Yes)	27 (84.4)	13 (48.1) **
Transportation, n (%)		
Primary mode of transport to clinic appointments		
Own car	7 (21.9)	8 (29.6)
Borrow car	2 (6.3)	1 (3.7)
Get ride	1 (3.1)	2 (7.4)
Public transportation (MARTA)	19 (59.4)	14 (51.8)
Walk	3 (9.4)	2 (7.4)
Miles to clinic, mean±SD	9.3 ± 5.1	9.5 ± 6.9
Time to clinic (minutes), mean±SD	37.7 ± 26.1	43.5 ± 25.2
Communication, n (%)		
Have a mobile phone? (Yes)	30 (93.8)	25 (92.6)
Trouble keeping minutes on phone? (Yes)	8 (25.0)	8 (29.6)
Phone number changed in past year? * (Yes)	10 (31.2)	18 (65.4) **
Average times phone # changed in past year, mean ± SD	0.38 ± 0.91	1.46 ± 1.58 ***

* $P < 0.05$,** $P < 0.01$,

 $P < 0.001$;

¥ patient self-report of stability of housing.

Means compared using the Mann-Whitney U test; proportions compares using a χ^2 test or Fischer exact test.

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