AIDS PATIENT CARE and STDs
Volume 30, Number 4, 2016

DOI: 10.1089/apc.2015.0263

The Impact of Youth-Friendly Structures of Care on Retention Among HIV-Infected Youth

Lana Lee, MD,[1] Baligh R. Yehia, MD, MPP, MSHP,[2] Aditya H. Gaur, MD,[3] Richard Rutstein, MD,[4] Kelly Gebo, MD, MPH,[5] Jeanne C. Keruly, MS, CRNP,[5] Richard D. Moore, MD, MHS,[5] Ank E. Nijhawan, MD, MPH,[6] and Allison L. Agwu, MD, ScM,[7] for the HIV Research Network

Abstract

Limited data exist on how structures of care impact retention among youth living with HIV (YLHIV). We describe the availability of youth-friendly structures of care within HIV Research Network (HIVRN) clinics and examine their association with retention in HIV care. Data from 680 15- to 24-year-old YLHIV receiving care at 7 adult and 5 pediatric clinics in 2011 were included in the analysis. The primary outcome was retention in care, defined as completing ≥2 primary HIV care visits ≥90 days apart in a 12-month period. Sites were surveyed to assess the availability of clinic structures defined *a priori* as 'youth-friendly'. Univariate and multivariable logistic regression models assessed structures associated with retention in care. Among 680 YLHIV, 85% were retained. Nearly half (48%) of the 680 YLHIV attended clinics with youth-friendly waiting areas, 36% attended clinics with evening hours, 73% attended clinics with adolescent health-trained providers, 87% could email or text message providers, and 73% could schedule a routine appointment within 2 weeks. Adjusting for demographic and clinical factors, YLHIV were more likely to be retained in care at clinics with a youth-friendly waiting area (AOR 2.47, 95% CI [1.11–5.52]), evening clinic hours (AOR 1.94; 95% CI [1.13–3.33]), and providers with adolescent health training (AOR 1.98; 95% CI [1.01–3.86]). Youth-friendly structures of care impact retention in care among YLHIV. Further investigations are needed to determine how to effectively implement youth-friendly strategies across clinical settings where YLHIV receive care.

Introduction

Increasing access to quality HIV care and improving retention in care for individuals living with HIV remain top priorities of the United States (US) National HIV/AIDS Strategy.[1,2] However, there is growing evidence that young people living with HIV (YLHIV) fare poorly compared to older adults. YLHIV are more likely to disengage from care, delay initiation of antiretroviral therapy (ART), and have lower rates of virologic suppression on ART.[3–9]

YLHIV face barriers to care that are unique to the developmental period of adolescence and young adulthood.[10,11] Like many youth with chronic illness, YLHIV must learn to cope with a chronic medical condition at a time when most peers are healthy. With growing independence, they must learn to integrate medical care with rapidly evolving adult roles and responsibilities and also to navigate complex health systems, including the ability to access confidential health care services, often without the support or knowledge of their family, partners, or friends.[6,7,12–14]

These challenges, along with others commonly faced by all people living with HIV (e.g., stigma, substance abuse, mental illness, lack of social support), likely impact the degree to which young people engage in care.[8] As a result, YLHIV require targeted services and structures within clinical care settings that can accommodate and support their unique developmental needs.

Youth-friendly health care is a widely used term to describe patient-centered approaches that accommodate the needs of YLHIV and may facilitate improved outcomes during the developmental transition from childhood to adulthood.[15] In 2002, the World Health Organization (WHO)

Divisions of [1]General Pediatrics and Adolescent Medicine, [5]Infectious Diseases, and [7]Adult and Pediatric Infectious Diseases, Department of Medicine, Johns Hopkins School of Medicine, Baltimore, Maryland.
[2]Department of Infectious Diseases, University of Pennsylvania Perelman School of Medicine, Philadelphia, Pennsylvania.
[3]Department of Infectious Diseases, St. Jude Children's Research Hospital, Memphis, Tennessee.
[4]Division of General Pediatrics, Children's Hospital of Philadelphia, Philadelphia, Pennsylvania.
[6]Department of Internal Medicine, University of Texas Southwestern Medical Center, Dallas, Texas.
Meetings: Society of Adolescent Health and Medicine Annual Meeting, Austin, TX. March 23, 2014.

developed a framework for youth-friendly health services that identified five key objectives to promote the delivery of quality health care for young people: accessibility, acceptability, appropriateness, effectiveness, and equity of care.[16] These principles provide an important framework for understanding the unique attributes of providing care for youth and are grounded in research that examine the help-seeking behaviors of youth, their barriers to access care, and the responsiveness of healthcare systems to provide quality health care for youth.[17]

The Institute of Medicine subsequently utilized the WHO principles as a framework to emphasize the need to develop youth-friendly health services in order to improve the health of young people in the US; however, greater understanding about how to operationalize and measure these principles by defining the structural and service components of effective high-quality youth-friendly health care are needed.[18,19]

Poor retention in care among YLHIV is a significant barrier to timely initiation of ART and achieving viral load suppression.[3,6] To date, there is limited information to describe approaches that may be important to retain YLHIV in care. Our study seeks to characterize the structural components of care determined *a priori* to be ''youth-friendly'' that are available in adult and pediatric clinics of the HIV Research Network (HIVRN) and assess their relationship with retention in care in order to identify potential areas of structural interventions in the clinic environment that facilitate retention among YLHIV.

Methods

Study design and population

A cross-sectional study was made of YLHIV 15–24 years old receiving care in the HIVRN during calendar year 2011. The HIVRN is a US consortium of 15 clinics located in the northeastern, midwestern, southern, and western US that provide outpatient primary and subspecialty HIV care. Data from 12 sites (7 adult and 5 pediatric) were included in this analysis. The remaining three sites did not have data available on youth services and were not included.

YLHIV who were enrolled prior to September 30, 2011 and had at least one outpatient visit at an HIVRN site in 2011 were included in analyses. Those who died ($n=12$), transferred out of a clinic ($n=97$), or enrolled within the last 90 days of 2011 ($n=57$) were excluded as they did not accrue enough time to meet criteria for retention in care. Transgender youth were also excluded due to small numbers ($n=5$).

Data were abstracted from medical records at each site and sent electronically to a data coordinating center after identifying information was removed. Additional data about available clinic structures (e.g., facilities, technology use, personnel) and on-site services (e.g., mental health, family planning, social work assistance) that could facilitate youth-targeted care at the clinic sites were obtained in a separate survey completed by clinic managers or medical directors.

For this analysis, only data related to the structural components of care were included in order to create a more parsimonious model and to mitigate potential differences in the quality of services across clinic settings. The responses were reviewed for completeness and sites were queried for clarification where applicable. Data were reviewed and verified by the coordinating center, and then merged across sites to create a uniform database. The study was approved by the institutional review boards at the Johns Hopkins School of Medicine and at each participating site.

Measures

Retention in care. The primary outcome was retention in care, defined as having two or more HIV outpatient visits in 2011 with at least 90 days between the first and last visits during the calendar year.[20] Outpatient visits refer to HIV primary care visits made to HIVRN clinics.

Demographic and clinical variables. Demographic and clinical data were collected from youth to include age category (15–19 years, 20–24 years), gender (male, female), self-reported HIV acquisition risk [heterosexual, men who have sex with men (MSM), perinatal/blood transfusion, other/unknown], race/ethnicity (white, black, Hispanic, other), first known CD4 cell count in 2011 (≥500, 350–499, 200–249, 0–199 cells/mm^3), use of ART in 2011, insurance status (insured, uninsured), and duration in care at the HIVRN site from enrollment to the end of 2011. Use of ART was extracted from the medical records to represent the prescription of three or more antiretroviral medications at any one time in the calendar year.

Youth-friendly structures of care. Using the WHO framework to characterize youth-friendly health systems (Accessible, Acceptable, Appropriate, Effective, and Equitable),[16,19] we defined structures of care considered to be youth-friendly *a priori* and specifically focused on structural components that could exist in both pediatric and adult clinics in order to deconstruct the cultural and environmental differences that are known to exist between these clinical settings. Although the WHO framework can be described as patient-friendly overall, these characteristics are especially relevant for youth given the unique vulnerabilities and barriers to care that exist in this population.

We examined the following structures of care: location of clinic, waiting area, patient–provider communication modalities, appointment availability and scheduling, and types of providers caring for youth.[13,18,19,21,22] Youth-friendly locations were defined as clinics that were easily accessible by public transportation (0–0.5 miles) and HIV clinics that were co-located in buildings with multiple specialties that served the general population, which could offer greater acceptability, accessibility, and equitability for youth seeking confidential care in comparison to HIV clinics located in stand-alone buildings dedicated to HIV care.

We defined youth-friendly waiting areas as a separate waiting area for youth or one intentionally designed to provide an engaging environment for youth (e.g., décor, availability of computers or other electronic media, youth-targeted informational resources with language and design).[18] Due to the common usage of mobile communications such as text messaging and email communications among youth, and evidence demonstrating its feasibility as a supportive service for retention and adherence, we defined the availability of mobile communications as a youth-friendly mode of communication.[23,24]

The availability of evening or weekend clinic hours and same-day walk-in appointments were considered youth-friendly since

increased availability and accessibility of appointments provide many youth who are in school or working during the day greater flexibility to attend appointments.[18] Short waiting periods for an available new patient appointment (<1 week) or follow-up appointment (<2 weeks) were also considered youth-friendly structures since these features increase accessibility and availability of services for youth, and would be appropriate given their high risk of attrition.

Access to providers with any formal adolescent health training was also examined as a youth-friendly structure. Formal adolescent health training was defined as an adolescent medicine clinical rotation, subspecialty fellowship in adolescent medicine, or public health coursework on adolescent health and development. Adolescent health training in the US often provides some degree of exposure to common health issues in this age group (e.g., sexual and reproductive health, mental health) as well as other adolescent health-related content including adolescent development and behavior, effective communication with youth populations, confidential care and minor consent laws, and care in alternative health settings where young people receive care (e.g., school-based and college health centers, juvenile detention).[24,25]

Analysis

Descriptive analyses characterized the demographic and clinical features of the youth in care and examined the availability of youth-friendly structures of care at HIVRN clinics. Associations between retention in care and availability of youth-friendly clinic structures were conducted using univariate and multivariable logistic regression clustered by site of care. Accessibility to public transportation and availability of same day walk-in appointments were excluded from the analysis since these structures were universally available at all clinics. Separate youth waiting areas were available to only a small number of youth attending pediatric clinics, thus this structure was also excluded from the analysis. Those structures with p values less than 0.2 and considered important *a priori* to the theoretical framework of youth-friendly care were included in the multivariable model, which also adjusted for age, gender, race/ethnicity, HIV acquisition risk, CD4 category, use of ART, and duration in care. Model fit was assessed using the Hosmer-Lemeshow statistic ($p = 0.13$).

Results

During the 2011 calendar year, there were 680 YLHIV who attended at least one clinic visit at an HIVRN site (Table 1). Among these youth, 512 (75%) were between 20–24 years old, 452 (67%) were male, and 477 (70%) were black. Over three-quarters of the sample were MSM (43%) and just over a third had acquired HIV perinatally or through blood transfusion (35%). Fifty percent of the cohort had CD4 counts <500 cells/mm^3 and 82% were prescribed ART. The majority of YLHIV were insured (70%) and nearly half had been enrolled in care at a HIVRN clinic for less than 2 years (47%). The numbers of YLHIV attending adult (51.6%) versus pediatric (48.4%) sites were nearly even.

With regards to clinic locality, all YLHIV attended clinic sites with easy accessibility to public transportation and 65% received care at HIV clinics that were co-located in a multispecialty building rather than a stand-alone HIV clinic.

Table 1. Demographic and Clinical Characteristics of Sample

Patient characteristics	*Study participants* N = *680*
Age	
15–19 years old	168 (24.7%)
20–24 years old	512 (75.3%)
Gender	
Female	228 (33.5%)
Male	452 (66.5%)
Race/ethnicity	
White	87 (12.8%)
Black	477 (70.1%)
Hispanic	99 (14.6%)
Other/unknown	17 (2.5%)
HIV acquisition risk	
Heterosexual	131 (19.2%)
MSM[a]	298 (43.9%)
PHIV/BLD[b]	238 (34.9%)
Other/unknown	13 (1.9%)
CD4 category (cells/mm^3)	
0–199	69 (10.1%)
200–349	105 (15.4%)
350–499	162 (23.8%)
500 and above	344 (50.6%)
ART prescribed	
No	122 (17.9%)
Yes	558 (82.1%)
Insurance status	
Uninsured	206 (30.3%)
Insured	474 (69.7%)
Duration in care	
Less than 1 year	204 (30.0%)
1–2 years	117 (17.2%)
2 or more year	359 (52.8%)

[a]MSM, men who have sex with men; [b]PHIV/BLD, perinatal-acquired/transfusion-acquired HIV.

Only 76 (11%) YLHIV attended a clinic with a separate waiting area for youth, all at pediatric sites. Less than half of YLHIV (48%) had waiting areas intentionally designed for young people (e.g., youth-targeted reading materials or décor). One-third (36%) of YLHIV were receiving care in clinics with evening hours, although all YLHIV in pediatric and adult clinics were able to schedule walk-in appointments for the same day. Most YLHIV were receiving care in clinics where email or text messages were utilized for patient-provider communications (87%).

The majority (58%) of YLHIV attended clinics with a less than 1-week wait time for new patient appointments and 73% were able to schedule a routine follow-up appointment within 2 weeks. Seventy-three percent of YLHIV were receiving care in clinics where providers with any type of training in adolescent health and development ranging from public health coursework, clinical rotation, or adolescent-medicine subspecialty fellowship were available.

Although a greater proportion of YLHIV attending pediatric clinics had access to several of the structures of interest, youth-friendly structures of care were not unique to pediatric clinics (Table 2). Among YLHIV enrolled in adult clinics, 74% were attending clinics co-located in multispecialty buildings compared to 54% of those attending pediatric HIV

Table 2. Number of Youth Attending Adult and Pediatric Clinics with Youth-Friendly Structures of Care

Youth-friendly structures of care	*Adult clinics* N = *351*	*Pediatric clinics* N = *329*	*All clinics* N = *680*
Easy accessibility to public transportation[a]	351 (100%)	329 (100%)	680 (100%)
Co-location in multispecialty building	261 (74.4%)	178 (54.1%)	439 (64.6%)
Separate youth waiting area[b]	0 (0%)	76 (23.1%)	76 (11.2%)
Youth targeted waiting area design	18 (5.1%)	308 (93.4%)	326 (47.9%)
Email and/or text messages	265 (75.5%)	329 (100%)	594 (87.4%)
Evening clinic hours	73 (20.8%)	172 (52.3%)	245 (36.0%)
Same day walk-in appointments[a]	351 (100%)	329 (100%)	680 (100%)
New patient appointment <1 week	219 (62.4%)	172 (52.3%)	391 (57.5%)
Next available routine visit <2 weeks	164 (46.7%)	329 (100%)	493 (72.5%)
Providers with adolescent training	168 (47.9%)	329 (100%)	497 (73.1%)

[a]Not included in analysis for retention in care due to universal availability to all YLHIV in sample.
[b]Not included in analysis for retention in care due to availability in small percentage of YLHIV in only pediatric clinics.

clinics; 76% were able to utilize email and text message communications with providers versus 100% in pediatric clinics; 62% had wait times of <1 week for a new patient appointment versus 52% of those in pediatric clinics; 47% had wait times of <2 weeks to a next available follow-up visits compared to all YLHIV in pediatric clinics; and 48% were attending clinics where adult providers with prior adolescent health training were available, whereas all YLHIV in pediatric clinics had providers with some adolescent health training. Waiting areas designed for youth populations were available to only 5% of YLHIV in adult clinics, compared to 93% of YLHIV in pediatric clinics.

Overall, 576 (85%) of YLHIV who had at least one clinic visit in 2011 were retained in care. Demographic and clinical characteristics by retention status are noted in Table 3, and youth-friendly care structures by retention status are noted in Table 4.

After adjusting for age, gender, race/ethnicity, HIV acquisition, CD4 category, ART use, insurance status, and duration in care, YLHIV who were receiving care in clinics with waiting areas intentionally designed for YLHIV were nearly 2.5 times more likely to be retained in care (AOR 2.47, 95% CI 1.11–5.52). Those who received care in clinics with evening hours (AOR 1.94; 95% CI 1.13–3.33), and providers with any training in adolescent health on staff (AOR 1.98; 95% CI 1.01–3.86) were nearly twice as likely to be retained in care (Table 5).

Discussion

Despite US national priorities to increase access to quality HIV care and improve retention in care for individuals living with HIV, YLHIV are faring worse along every stage of the HIV care continuum compared to their older adult counterparts.[8,26–29] Prior studies have shown the strong correlation between retention and viral load suppression.[30–32] With the notable disparities in outcomes and poor viral load suppression rates among youth, the importance of retaining young people in care is critical. Determining the structures of care available in HIV clinic settings that support retention in care for this challenging population can facilitate a greater number of youth to initiate ART earlier and ultimately achieve viral load suppression. Few studies to date have examined specific structural components of care that could inform the development of effective interventions targeted to YLHIV and improve retention in this population. Our study advances this field of research and identifies the availability of evening clinic hours, youth-friendly waiting areas, and the availability of providers with training in adolescent health and development as structures of care that may facilitate retention among YLHIV.

Table 3. Demographic and Clinical Characteristics by Retention Status Using χ^2 Tests

Patient characteristics	*Retained in care* N = *576* *(84.7%)*	*Not retained* N = *104* *(15.3%)*	p *Value*
Age			
15–19 years old	157 (93.5%)	11 (6.5%)	<0.001
20–24 years old	419 (81.8%)	93 (18.2%)	
Gender			
Female	199 (87.3%)	29 (12.7%)	0.19
Male	377 (83.4%)	75 (16.6%)	
Race			
White	70 (80.5%)	17 (19.5%)	0.001
Black	410 (86.0%)	67 (14.0%)	
Hispanic	87 (87.9%)	12 (12.1%)	
Other/unknown	9 (52.9%)	8 (47.1%)	
HIV acquisition risk			
Heterosexual	107 (81.7%)	24 (18.3%)	<0.001
MSM	240 (80.3%)	58 (19.7%)	
PHIV/BLD	221 (92.9%)	17 (7.1%)	
Other/unknown	8 (61.5%)	5 (38.5%)	
CD4 category (cells/mm^3)			
0–199	56 (81.2%)	13 (18.8%)	0.03
200–349	80 (76.2%)	25 (23.8%)	
350–499	139 (85.8%)	23 (14.2%)	
500 and above	301 (87.5%)	43 (12.5%)	
ART prescribed			
No	81 (66.4%)	41 (33.6%)	<0.001
Yes	495 (88.7%)	63 (11.3%)	
Insurance status			
Uninsured	167 (81.1%)	39 (18.9%)	0.08
Insured	409 (86.3%)	65 (13.7%)	
Duration in care			
Less than 1 year	157 (77.0%)	47 (23.0%)	<0.001
1–2 years	93 (79.5%)	24 (20.5%)	
2 or more year	326 (90.8%)	33 (9.2%)	

Table 4. YLHIV in Clinics with Youth-Friendly Structures by Retention Status Using χ^2 Tests

Youth-friendly structures of care	*Retained in care* N = *576* *(84.7%)*	*Not retained* N = *104* *(15.3%)*	p *Value*
Co-location in multispecialty building			
No	209 (86.7%)	32 (13.3%)	0.28
Yes	367 (83.6%)	72 (16.4%)	
Youth targeted waiting area design			
No	270 (76.3%)	84 (23.7%)	<0.001
Yes	306 (93.9%)	20 (6.1%)	
Email and/or text messages			
No	58 (67.4%)	28 (32.6%)	<0.001
Yes	518 (87.2%)	76 (12.8%)	
Evening clinic hours			
No	355 (81.6%)	80 (18.4%)	0.003
Yes	221 (90.2%)	24 (9.8%)	
New patient appointment			
Wait time <1 week	337 (86.2%)	54 (13.8%)	0.21
Wait time ≥1 week	239 (82.7%)	50 (17.3%)	
Next available routine visit			
Wait time <2 weeks	442 (89.7%)	51 (10.3%)	<0.001
Wait time ≥2 weeks	134 (71.7%)	53 (28.3%)	
Providers with adolescent training			
No	132 (72.1%)	51 (27.9%)	<0.001
Yes	444 (89.3%)	53 (10.7%)	

Table 5. Bivariate and Multivariable Logistic Regression of Youth-Friendly Structures and Retention in Care

	Odds ratio (OR)	*Adjusted odds ratio (AOR)*
Age		
15–19 years old	Ref.	Ref.
20–24 years old	0.32 (0.16–0.61)	0.85 (0.42–1.73)
Gender		
Female	Ref.	Ref.
Male	0.73 (0.46–1.16)	1.12 (0.54–2.33)
Race		
White	Ref.	Ref.
Black	1.49 (0.82–2.68)	0.80 (0.48–1.33)
Hispanic	1.76 (0.79–3.93)	1.48 (0.58–3.76)
HIV acquisition risk		
Heterosexual	Ref.	Ref.
MSM	0.93 (0.55–1.57)	0.88 (0.38–2.01)
PHIV/BLD	2.92 (1.50–5.66)	0.81 (0.34–1.95)
Other/unknown	0.36 (0.11–1.19)	0.19 (0.04–1.03)
CD4 category (cells/mm^3)		
0–199	Ref.	Ref.
200–349	0.74 (0.35–1.58)	0.79 (0.35–1.78)
350–499	1.40 (0.66–2.96)	1.25 (0.59–2.63)
500 and above	1.63 (0.82–3.22)	1.48 (0.62–3.54)
ART prescribed		
No	Ref.	Ref.
Yes	3.98 (2.52–6.29)	4.96 (3.08–8.01)
Insurance status		
Uninsured	Ref.	Ref.
Insured	1.47 (0.95–6.29)	0.82 (0.46–1.46)
Duration in care		
Less than 1 year	Ref.	Ref.
1–2 years	1.16 (0.67–2.02)	0.99 (0.52–1.88)
2 or more year	2.96 (1.82–4.80)	1.48 (0.69–3.18)
Youth-friendly waiting area		
No	Ref.	Ref.
Yes	4.76 (2.85–7.96)	2.47 (1.11–5.52)
Email and/or text messages		
No	Ref.	Ref.
Yes	2.08 (1.28–3.37)	1.07 (0.50–2.28)
Evening clinic hours		
No	Ref.	Ref.
Yes	2.08 (1.28–3.37)	1.94 (1.13–3.33)
Next available routine visit		
Wait time <2 weeks	Ref.	Ref.
Wait time ≥2 weeks	0.29 (0.19–0.45)	0.75 (0.36–1.58)
Providers with adolescent training		
No	Ref.	Ref.
Yes	3.24 (2.10–4.98)	1.98 (1.01–3.86)

The literature concerning YLHIV concentrates heavily in pediatric and adolescent clinical environments; however, data from the HIVRN suggest that the majority of YLHIV ages 15–24 years old are attending adult HIV clinics.[33] This is not surprising since 75% of new HIV infections occur among young adults in the 20–24 year age group.[34] Although many pediatric and adolescent HIV clinics care for YLHIV up through the age of 25, YLHIV are more likely to enter care in adult care settings due to the larger numbers of adult-centered HIV clinic sites available and the transitional age of this population. Thus, broadening the scope of effective and feasible youth-targeted care practices across both adult and pediatric care settings is an important area of need.

In this study, we found that both adult and pediatric clinics in the HIVRN offered a variety of care structures that were youth-friendly. A greater proportion of YLHIV enrolled at pediatric clinics had access to many youth-friendly structures of interest compared to those enrolled at adult clinics. However, most of the youth-friendly structures we examined were available to nearly 50% or more of YLHIV receiving care at adult clinics, with the exception of youth-targeted waiting areas (separate physical space or intentional youth-targeted design) and evening clinic hours.

Studies looking at the transition of young people with special health care needs from pediatric to adult care settings have described differences in the culture and environments of pediatric and adult-oriented medicines, highlighting contrasts in the organization of care, treatment practices, and communication styles.[35,36] Despite these differences, our findings suggest that many adult HIV clinics may already be providing components of care in their current delivery models that can be considered youth-friendly. Further work to determine the availability of other youth-friendly structures and services in adult clinical care settings may provide insight into the development of potential cost-effective structural interventions that impact outcomes among YLHIV.

YLHIV attending clinics with a waiting area intentionally designed for youth engagement (e.g., health literature, electronic media, décor) were more likely to be retained in care. In a study of 15 adolescent HIV clinics in the Adolescent Trials Network, clinical environments were identified as a potential structural barrier for young people seeking care.[13,18] Waiting rooms of HIV clinics are important areas of the clinical setting and may shape the experiences of YLHIV with their illness and perceptions of clinical care, including

potential exposure to stigmatizing comments from other patients or inadvertent disclosure of their HIV status to older adults in their communities. As a result, YLHIV may feel uncomfortable and vulnerable in a place where trust and supportive care are essential. Available spaces to provide a separate youth-friendly waiting area are often limited and were only available to 11% of the YLHIV in our sample.

We also found that access to evening clinic hours was significantly associated with retention among YLHIV. Evening and weekend clinic hours promote clinic accessibility and have been shown to decrease repeated emergency department use and hospitalizations among people living with HIV.[37,38] Although extended clinic hours may broadly benefit people of all ages, YLHIV may especially benefit from the increased opportunities to access health services and engage in care as a historically underserved and difficult to reach population.[19,39,40] Although extended clinic hours or other alternative scheduling of clinical staff and building operations may be limited by available resources, future directions for incorporating structural changes in clinic settings should consider offering extended clinic hours to YLHIV clients and other vulnerable populations.

The availability of providers with adolescent health training may also play a role in increasing retention in care among YLHIV. In our study, YLHIV attending clinics with providers with any adolescent health training were nearly twice as likely to be retained in care as compared to those without any adolescent health trained providers on staff. Although adolescent medicine subspecialty-trained physicians and adolescent health pediatric nurse practitioners pursue additional training to care for YLHIV with complex conditions, they comprise only a small proportion of the providers who see adolescent and young adult populations in the US.[19,41,42] Developing a more robust adolescent health care workforce capable of responding effectively to important adolescent health issues such as mental health illness, sexual health, and to address complex psychosocial needs may be an important approach to increase engagement in care and strengthen self-efficacy around important healthy behaviors among YLHIV.[43–45]

Physicians in adult primary care specialties (internal medicine and family practice) generally are not required to receive adolescent or young adult-specific training, whereas all pediatric residency programs are required to have a minimum 4-week clinical experience in adolescent medicine.[46] Providers, including pediatricians, have reported feeling inadequately prepared to discuss sensitive adolescent health issues such as mental health illness, reproductive health, and violence.[47–49] In a qualitative study of adult and pediatric HIV providers, differences in the awareness of the developmental features of adolescence and young adulthood emerged as a possible influencing factor regarding providers' approaches to care for youth.[12] Determining the impact of provider-targeted interventions focusing on effective competencies for adolescent health care may be an important step towards improving care for YLHIV and improving retention among this population.

There were several limitations to our study. First, since this was a cross-sectional study, our findings cannot determine causality and additional longitudinal studies to examine the impact of youth-friendly care are needed. Additionally, although the study sites were located in urban areas where the HIV epidemic among YLHIV is concentrated, they were not a nationally representative sample, and our findings may not be generalizable to all pediatric or adult clinics. Third, although the availability of the youth-friendly structures of care were assessed, we were unable to determine the quality of these structures or the extent to which individual YLHIV utilized these care structures.

Standardized measures for youth-friendly care are not consistent in the literature and further work to define the properties of quality youth-friendly care and utilization of such services would greatly enhance evaluations of youth HIV clinical programs. Finally, we were not able to assess for additional patient-level psychosocial factors such as social support or stigma, as this was beyond the scope of our study.

In conclusion, defining targeted youth-friendly structures of care available in both pediatric and adult HIV clinical settings is an important approach to retain YLHIV in care. YLHIV receiving care in clinics with youth-targeted waiting areas, evening clinic hours, and providers with any adolescent health training may be more likely to be retained in care. Further work to determine specific characteristics, quality measures, and effective implementation of youth-friendly care are necessary to improve treatment outcomes in this population.

Acknowledgments

The authors wish to thank all patients, providers, investigators, and staff involved in the HIV Research Network.

Funding: This study was supported by the Agency for Healthcare Research and Quality (HHSA290201100007C), the Health Resources and Services Administration (HHS H250201200008C), the National Institutes of Health (U01 DA036945, P30 AI094189), and the Clinical Investigation and Biostatistics Core of the UC San Diego Center for AIDS Research (AI036214). Dr. Lee was supported by the National Institute of Child Health Development (T32HD052459). Dr. Yehia was supported by the National Institutes of Health/ National Institutes of Mental Health (K23-MH097647). Dr. Agwu was supported by the National Institutes of Allergy and Infectious Diseases (1K23 AI084549).

Author Disclosure Statement

No financial conflicts of interest are declared.

References

1. Millett GA, Crowley JS, Koh H, et al. A way forward: The National HIV/AIDS Strategy and reducing HIV incidence in the United States. JAIDS 2010;55:S144–S147.
2. Yehia B, Frank I. Battling AIDS in America: An evaluation of the National HIV/AIDS Strategy. Am J Public Health 2011;101:e4–e8.
3. Torian LV, Wiewel EW. Continuity of HIV-related medical care, New York City, 2005–2009: Do patients who initiate care stay in care? AIDS Patient Care STDS 2011; 25:79–88.
4. Ryscavage PA, Anderson EJ, Sutton SH, Reddy S, Taiwo B. Clinical outcomes of adolescents and young adults in adult HIV care. JAIDS 2011;58:193–197.
5. Agwu AL, Fleishman JA, Korthuis PT, et al. Disparities in antiretroviral treatment: A comparison of behaviorally HIV-infected youth and adults in the HIV research network. JAIDS 2011;58:100–107.

6. Minniear TD, Gaur AH, Thridandapani A, Sinnock C, Tolley EA, Flynn PM. Delayed entry into and failure to remain in HIV care among HIV-infected adolescents. AIDS Res Hum Retroviruses 2013;29:99–104.
7. Giordano TP, Visnegarwala F, White AC, et al. Patients referred to an urban HIV clinic frequently fail to establish care: Factors predicting failure. AIDS Care 2005;17:773–783.
8. Zanoni BC, Mayer KH. The adolescent and young adult HIV cascade of care in the United States: Exaggerated health disparities. AIDS Patient Care STDS 2014;28:128–135.
9. Yehia BR, Fleishman JA, Metlay JP, Moore RD, Gebo KA. Sustained viral suppression in HIV-infected patients receiving antiretroviral therapy. JAMA 2012;308:339–342.
10. Vijayan T, Benin AL, Wagner K, Romano S, Andiman WA. We never thought this would happen: Transitioning care of adolescents with perinatally acquired HIV infection from pediatrics to internal medicine. AIDS Care 2009; 21:1222–1229.
11. Committee on Pediatric AIDS. Transitioning HIV-infected youth into adult health care. Pediatrics 2013;132:192–197.
12. Lee L, Rand CS, Ellen JM, Agwu AL. Factors informing HIV providers' decisions to start antiretroviral therapy for young people living with behaviorally acquired HIV. J Adolesc Health 2014;55:358–365.
13. Philbin MM, Tanner AE, DuVal A, Ellen J, Kapogiannis B, Fortenberry JD. Linking HIV-positive adolescents to care in 15 different clinics across the United States: Creating solutions to address structural barriers for linkage to care. AIDS Care 2013;26:12–19.
14. Yehia BR, Kangovi S, Frank I. Patients in transition: Avoiding detours on the road to HIV treatment success. AIDS 2013;27:1529–1533.
15. Ambresin AE, Bennett K, Patton GC, Sanci LA, Sawyer SM. Assessment of youth-friendly health care: A systematic review of indicators drawn from young people's perspectives. J Adolesc Health 2013;52:670–681.
16. World Health Organization. *Making Health Services Adolescent Friendly.* Geneva, Switzerland 2002.
17. Tylee A, Haller DM, Graham T, Churchill R, Sanci LA. Youth-friendly primary-care services: How are we doing and what more needs to be done. Lancet 2007;369:1565–1573.
18. Tanner AE, Philbin MM, Duval A, et al. ''Youth friendly'' clinics: Considerations for linking and engaging HIV-infected adolescents into care. AIDS Care 2014;26:199–205.
19. National Research Council and Institute of Medicine. *Adolescent Health Services: Missing Opportunities*. Committee on Adolescent Health Care Services and Models of Care for Treatment, Prevention, and Healthy Development, R.S. Lawrence, J. Appleton Gootman, and L.J. Sim, Editors. Board on Children, Youth, and Families. Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press. 2009.
20. Yehia BR, Fleishman JA, Metlay JP, et al. Comparing different measures of retention in outpatient HIV care. AIDS 2012;26:1131–1139.
21. Yehia BR, Agwu AL, Schranz A, et al. Conformity of pediatric/adolescent HIV clinics to the patient-centered medical home care model. AIDS Patient Care STDS 2013; 27:272–279.
22. Yehia BR, Gebo KA, Hicks PB, et al. Structures of care in the clinics of the HIV research network. AIDS Patient Care STDS 2008;22:1007–1013.
23. Cornelius JB, Dmochowski J, Boyer C, St. Lawrence J, Lightfoot M, Moore M. Text-messaging-enhanced HIV intervention for African American adolescents: A feasibility study. J Assoc Nurses AIDS Care 2013;24:256–267.
24. Belzer ME, Macdonell KK, Clark LF, Huang J, et al. Acceptability and feasibility of a cell phone support intervention for youth living with HIV with nonadherence to antiretroviral therapy. AIDS Patient Care STDS 2015; 29:338–345.
25. Emans SJ, Austin SB, Goodman E, et al. Improving adolescent and young adult health: Training the next generation of physician scientists in transdisciplinary research. J Adolesc Health 2010;46:100–109.
26. Gardner EM, McLees MP, Steiner JF, Del Rio C, Burman WJ. The spectrum of engagement in HIV care and its relevance to test-and-treat strategies for prevention of HIV infection. Clin Infect Dis 2011;52:793–800.
27. Agwu AL, Neptune A, Voss C, Yehia B, Rutstein R, for the HIVRN. CD4 counts of nonperinatally HIV–infected youth and young adults presenting for HIV care between 2002 and 2010. JAMA Pediatr 2014;168:381–383.
28. Yehia BR, French B, Fleishman JA, et al. Retention in care is more strongly associated with viral suppression in HIV-infected patients with lower versus higher CD4 counts. JAIDS 2014;65:333–339.
29. Fleishman JA, Yehia BR, Moore RD, Korthuis PT, Gebo KA, for the HIVRN. Establishment, retention, and loss to follow-up in outpatient HIV care. JAIDS 2012;60:249–259.
30. Yehia BR, Rebeiro P, Althoff KN, et al. Impact of age on retention and viral suppression. JAIDS 2015;68:413–419.
31. Blank AE, Fletcher J, Verdecais N, Garcia I, Blackstock O, Cunningham C. Factors associated with retention and viral suppression among a cohort of HIV+ women of color. AIDS Patient Care STDS 2015;29 Suppl 1:S27–S35.
32. Lucas GM, Chaisson RE, Moore RD. Highly active antiretroviral therapy in a large urban clinic: Risk factors for virologic failure and adverse drug reactions. Ann Intern Med 1999;131:81–87.
33. Agwu AL, Siberry GK, Ellen J, et al. Predictors of highly active antiretroviral therapy utilization for behaviorally HIV-1-infected youth: Impact of adult versus pediatric clinical care site. J Adolesc Health 2012;50:471–477.
34. Centers for Disease Control and Prevention. HIV Surveillance Report, 2009. 2011;21.
35. O'Sullivan-Oliveira J, Fernandes SM, Borges LF, Fishman LN. Transition of pediatric patients to adult care: An analysis of provider perceptions across discipline and role. Pediatr Nurs 2014;40:113–142.
36. Reiss JG, Gibson RW, Walker LR. Health care transition: Youth, family, and provider perspectives. Pediatrics 2005;115:112–120.
37. Laine C, Markson LE, Fanning TR, Turner BJ. Relationship between ambulatory care accessibility and hospitalization for persons with advanced HIV disease. J Health Care Poor Underserved 1999;10:313–327.
38. Markson L, Houchens R, Fanning T, Turner B. Repeated Emergency Department use by HIV-infected persons: Effect of clinic accessibility and expertise in HIV care. J Acquir Immune Defic Syndr Hum Retrovirol 1998;17: 35–41.
39. Woods ER. Overview of the special projects of national significance program's 10 models of adolescent HIV care. J Adolesc Health 1998;23:5–10.

40. Blum R. Contemporary threats to adolescent health in the United States. JAMA 1987;257:3390–3395.
41. Klein JD. Adolescents, health services, and access to care. J Adolesc Health 2000;27:293–294.
42. Althouse Stockman JA. Pediatric workforce: A look at adolescent medicine data from the American Board of Pediatrics. J Pediatr 2007;150:100–102.e2.
43. Lee L, Upadhya KK, Matson PA, Adger H, Trent ME. The status of adolescent medicine: Building a global adolescent workforce. Int J Adolesc Med Health 2015 Jul 9. [In press]
44. Brown LK, Whiteley L, Harper GW, Nichols S, Nieves A, and the ATN 086 Protocol Team. Psychological symptoms among 2032 youth living with HIV: A multisite study. AIDS Patient Care STDs 2015;29:212–219.
45. Boone MR, Cherenack EM, Wilson PA, and the ATN 086/106 Protocol Team. Self-efficacy for sexual risk reduction and partner HIV status as correlates of sexual risk behavior among HIV-positive adolescent girls and women. AIDS Patient Care STDs 2015;29:346–353.
46. ACGME. ACGME program requirements for graduate medical education in pediatrics. Available at: https://www.acgme.org/acgmeweb/Portals/0/PFAssets/ProgramRequirements/120_family_medicine_07012014.pdf (Last accessed February 2, 2015).
47. Frankenfield DL, Keyl PM, Gielen A, Wissow LS, Werthamer L, Baker SP. Adolescent patients—healthy or hurting?: Missed opportunities to screen for suicide risk in the primary care setting. Arch Pediatr Adolesc Med 2000;154:162–168.
48. Hellerstedt WL, Smith AE, Shew ML, Resnick MD. Perceived knowledge and training needs in adolescent pregnancy prevention: Results from a multidisciplinary survey. Arch Pediatr Adolesc Med 2000;154:679–684.
49. Borowsky I, Ireland M. National survey of pediatricians' violence prevention counseling. Arch Pediatr Adolesc Med 1999;153:1170–1176.

Address correspondence to:
Lana Lee, MD
David M. Rubenstein Child Health Building
200 N. Wolfe Street Room 2015
Baltimore, MD 21287

E-mail: llee74@jhmi.edu