

## Challenges to HIV management among youth engaged in HIV care

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### Abstract:

Regardless of medical advancements, new HIV infections persist. Young adults are most often newly infected, thus research is needed to assess medication adherence barriers specific to young adults with HIV. The data were abstracted from medical charts to include both self-reported behavioral and psychological distress data and HIV parameters in 2013 among patients aged 18–30 years. Descriptive and logistic regression analyses were conducted to identify factors related to viral suppression and sexually transmitted infection (STI) status. A total of 335 individuals presented for care during a 12-month period at a single clinic. The majority were African American and had a mean age of 25.6 years. Nearly all had current prescriptions of antiretroviral therapy (ART). Among those receiving ART, almost three-quarters were virally suppressed, as measured by 200 copies/mL. STI tests are conducted annually and by assessed need; 30% of this sample had at least 1 bacterial STI diagnosis within the last year. Psychological distress symptoms were more common among individuals who were not virally suppressed, compared to those who were virally suppressed. Women and individuals with moderate to severe symptoms of depression had higher odds of having unsuppressed viral loads. The independent factors associated with having any STIs were being African American or other minorities and having two or more sex partners. Our findings related to how young adults are managing their HIV care suggest that increased efforts aimed to prevent additional STIs and manage psychological distress will likely reduce transmission risks.

**Keywords:** Youth | adolescents | young adults | HIV/AIDS | HIV management | psychiatric disorders | psychological distress | mental illness

### Article:

#### Introduction

Despite tremendous advancements in HIV treatment, approximately 50,000 new HIV infections occur annually in the U.S.; these rates have not changed in over a decade (Bangsberg et al., [2]; CDC, [5]). It is estimated that there are 1.1 million individuals with HIV in the U.S., and yet only approximately 20% have been retained in care, started on antiretroviral therapies (ARTs) and attained an undetectable HIV viral load (Gardner, McLees, Steiner, Del, & Burman, [10]). Our current best prevention strategies for individuals with HIV are ART, which has shown to reduce HIV transmission risk by 96%. Thus, getting infected individuals identified, in care, and on medication is a public health priority (Cohen et al., [7]). Moreover, virologic suppression is one of the most important predictors of patient outcome (El-Khatib et al., [9]; Saberi, Caswell, Amodio-Groton, & Alpert, [28]). Therefore, it is critically important that we identify and address factors that result in poor virologic outcomes.

Current trends indicate that older adolescents and young adults are most at risk for HIV infection. The HIV incidence rates of infection among 20–24 year olds were 36.4/100,000 for 20–24 year olds and 35.2/100,000 among ages 25–29, meaning 2 of every 5 infections in the U.S. occur among young people (Kaiser Family Foundation, [13]). Specifically in the St. Louis metropolitan area, there were 94 incident cases of HIV in 13–24 year-olds and 86 incident cases in 25–34 year-olds in 2011 with a state-wide prevalence rate of 202.5–319.3/100,000 individuals with HIV (CDC, [5]). Also in the St. Louis area, between 1997 and 2002, 73% of those diagnosed with HIV were linked to care within 1 year (Perkins, Meyerson, Klinkenberg, & Laffoon, [23]). Overall, Gardner's cascade suggests that young adults are least likely to be diagnosed, linked to or retained in care, prescribed ART, or achieve viral suppression (Gardner et al., [10]).

HIV testing, care linkage, and continued treatment each have different barriers, especially for youth (Philbin, Tanner, Duval, Ellen, Kapogiannis, et al., [24]; Philbin, Tanner, Duval, Ellen, Xu, et al., [25]; Tanner et al., [33]). Prevention challenges unique to youth include a low perception of HIV risk, low rates of testing, low rates of condom use, high rates of other STIs, having older sex partners, substance use, homelessness, insufficient education, and feelings of isolation (Anema et al., [1]; CDC, [3]; Mustanski & Newcomb, [19]; Philbin, Tanner, Duval, Ellen, Kapogiannis, et al., [24]; Philbin, Tanner, Duval, Ellen, Xu, et al., [25]; Tanner et al., [33]).

Challenges to HIV medication adherence across the lifespan are associated with social determinants of health including employment, income, race, stable housing, experiences of discrimination, neighborhood conditions, and psychiatric disorders, including substance use; all of these factors complicate HIV management (Cohn et al., [8]; Mayer et al., [16]; Phillips et al., [26]). Little is known about the multi-level barriers to continued engagement in care for young adults. Yet, mental health issues have commonly been associated with medication nonadherence among young adults engaged in care (Mustanski & Newcomb, [19]; Outlaw et al., [20]; Wilkinson et al., [34]). Additionally, feelings of optimism about treatment options are connected with increased sexual risk behavior among young adult gay and bisexual males (Huebner, Rebchook, & Kegeles, [12]). Gaps in understanding barriers to continued engagement in care for youth persist.

Accordingly, the purpose of this study was to examine the association between mental health, sexual behaviors, and viral load suppression among young adults living with HIV.

## Methods

This was a cross-sectional study of sociodemographic characteristics, psychological distress symptoms, HIV transmission risk behaviors, and their association with HIV management, as measured by viral load suppression. Medical records were abstracted for patients aged 18–30 years who received care at the Washington University HIV Clinic in St. Louis, Missouri, throughout 2013. To complement the medical records, standard of care behavioral assessments conducted during regular clinic visits were also abstracted. As not all patients that were seen in 2013 with medical records had completed an assessment in that same period, we used the most recent completed assessment between 2012 and 2013; all patients with at least one complete assessment were eligible to participate. Washington University School of Medicine Human Research Protection Office approved this study.

## Measures

The computer-based behavioral assessment was conducted while each patient waited for their provider. These assessments included measures of demographic characteristics (employment, education, and annual income), depressive symptomatology as measured by the Patient Health Questionnaire (PHQ-9), which includes an item related to suicidal ideation (Spitzer, Kroenke, Williams, & the Patient Health Questionnaire Primary Care Study Group, [32]) and anxiety symptoms as measured by the Generalized Anxiety Disorder-7 (GAD-7) (Spitzer, Kroenke, Williams, & Lowe, [31]). The PHQ-9 had a Cronbach's  $\alpha$  reliability of .89 and the GAD-7 had .87 in this sample. HIV transmission risk behaviors assessed included: condom use at last sex, number of partners in the last 3 months, alcohol use in last 7 days, and illicit drug use (crack/cocaine, speed/methamphetamine, heroin/other nonprescription opioids) within the past 30 days.

Data abstracted from medical charts included age, race, current CD4 cell count, plasma HIV RNA level, and receipt of ART; as well as sexually transmitted infections (STIs) that were diagnosed during the previous 12 months (gonorrhea, chlamydia, and/or trichomoniasis). Testing for gonorrhea, chlamydia, and syphilis is performed at least annually in all patients. ART was defined as the use of at least three drugs from two different antiretroviral drug classes, including Nucleoside Reverse Transcriptase Inhibitors, Protease Inhibitors, Non-Nucleoside Reverse Transcriptase Inhibitors, or Integrase Strand-Transfer Inhibitors. Virologic suppression was defined as having an HIV RNA level of <200 copies/mL, as the sensitivity of the standard test was available at the time.

HIV viral load, the dependent variable, was dichotomized (<200 copies/mL and >200 copies/mL) to define virologic suppression. Education levels were dichotomized: <high school graduate/GED or >than a high school degree. Employment status was dichotomized into unemployed (including receiving disability benefits) and employed (part- or full-time). Annual income was dichotomized into < and >\$10,000. Depression and anxiety severity were both dichotomized to those who expressed symptoms of none to mild versus moderate to severe

depression scores (>15) and anxiety scores (>10) within the past 2 weeks. Age was dichotomized to assess for differences between older adolescents and young adults (18–24, 25–30 years). Alcohol consumption was dichotomized to <4 drinks reported per week and >5 drinks per week; in previous research, we identified that this low threshold was associated with being virally unsuppressed (Shacham, Agbebi, Stamm, & Overton, [29]).

## **Statistical analyses**

Descriptive analyses were conducted. Bivariate analyses (chi-square) were used to assess differences in the sample by sociodemographic characteristics, psychological distress symptoms, and HIV transmission risk behaviors with HIV viral loads (Shacham, Nurutdinova, Onen, Stamm, & Overton, [30]). HIV viral loads were used as a proxy for medication adherence (Shacham et al., [30]). Logistic regression analyses were conducted among individuals with ART and the final model was presented as the best fit based on likelihood ratios.

We also conducted bivariate comparisons between individuals having 1 STI and more than 1 in the previous 12 months. Logistic regression analyses were conducted, only among individuals receiving ART, and the final model was presented as the best fit using likelihood ratios. Bivariate tests were two tailed and  $p < .05$  was considered significant. Data analyses were performed using SPSS software (version 21.0). The factors included in the logistic regression were significant in bivariate analyses <0.10 (age, race, gender, depressive symptomatology, anxiety symptomatology, and suicidal ideation).

## **Results**

### **Sample description**

A total of 335 young adults (18–30 year olds) presented for care at this HIV clinic during the 12-month period in 2013. The majority were African American ( $n = 290$ , 86.6%), male ( $n = 251$ , 74.9%), and had a mean age of 25.6 (SD = 2.8). Nearly 15% of the sample considered themselves homeless ( $n = 44$ ), while about 40% were employed ( $n = 129$ ). Almost all of the participants were prescribed ART ( $n = 305$ , 91%) and about two-thirds of the entire sample were virally suppressed (viral load < 200 copies/mL,  $n = 227$ , 67.8%). Among individuals receiving ART, 72.8% were virally suppressed. Nearly the entire sample ( $n = 301$ ; 90.0%) had CD4 cell counts  $\geq 200$  cells/mm<sup>3</sup>. Table 1 provides additional details of the sample.

### **Alcohol and illicit drug use patterns**

When assessing illicit drug use, 3% reported ever injecting drugs. In the last 30 days, 37.3% reported using marijuana ( $n = 125$ ), 3.3% reported using crack or cocaine ( $n = 11$ ), 2.1% reported using speed/methamphetamine ( $n = 7$ ), and 2.4% reported using heroin/opiates ( $n = 8$ ) at least once in the last month. A majority ( $n = 208$ , 62%) endorsed alcohol consumption in the last 3 months and of those, only 5.1% ( $n = 17$ ) reported drinking >5 drinks per week while 57.0% consumed <4 drinks in the previous week, among those who reported drinking alcohol within the last 3 months.

**Table 1.** Sample characteristics (n = 335).

	n	%
Race		
African American/Other minorities	290	86.6
Caucasian	45	13.4
Gender		
Male	251	74.9
Female	77	23.0
Transgender (Male to Female)	7	2.1
Mean age	25.6 (SD 2.8)	
18–24	127	37.9
25–30	208	62.1
Income (n = 325)		
<\$10,000	147	43.9
≥\$10,000	178	53.1
Education (n = 258)		
≤ High school/equivalent	146	43.6
>High school	112	33.4
Homeless (n = 258)		
No	214	63.9
Yes	44	13.1
Employment (n = 258)		
Unemployed	129	38.5
Employed full-time or part-time	129	38.5
Receiving ART	305	91
HIV viral load (n = 329)		
<199 copies/mL	227	67.8
≥200 copies/mL	102	30.4
CD4 cell count		
<199 cells/mm <sup>3</sup>	33	9.9
≥200 cells/mm <sup>3</sup>	302	90.1
STI within last 12 months		
One	54	16.1
Two or more	48	14.3
STI by type		
Gonorrhea/chlamydia	60	17.9
Syphilis	126	37.6
Trichomoniasis	7	2.1
Number of partners within the last 3 months (n = 283)		
One	70	20.9
Two or more	37	11.0
Reported condom use at last sex (n = 246)	198	59.1
Depressive symptoms (n = 245)		
None-mild	206	61.5
Moderate-severe	39	11.6
Anxiety symptoms (n = 235)		
None-mild symptoms	183	54.6
Moderate-severe symptoms	52	15.5
Suicidal ideation (n = 245)	45	13.4
Average drinks per week		
<4 drinks	191	57.0
≥5 or more	17	5.1
Reported marijuana use (n = 228)	125	37.3
Reported crack/cocaine use (n = 235)	11	3.3
Reported methamphetamine/speed use (n = 233)	7	2.1
Reported heroin/opiate use (n = 232)	8	2.4
Reported injected drug use (n = 236)	11	3.3

## Psychological distress symptoms

As identified by the PHQ-9, moderate to severe depressive symptoms were endorsed among 11.6% of participants ( $n = 39$ ) and 15.5% presented moderate to severe symptoms of anxiety ( $n = 52$ ) according to the GAD-7. Additionally, 13.4% of participants endorsed having suicidal ideation within the previous 2 weeks ( $n = 45$ ).

**Table 2.** Bivariate and predictive sociodemographic associations with HIV viral suppression.

	Viral load < 200 copies/mL, n (%)	Viral load $\geq$ 200 copies/mL, n (%)	p- Value	Adjusted odds ratio	95% CI
Race			.033		
African American/other minorities	191 (66.8)	95 (33.2)		3.762	.057– 1.243
Caucasian	36 (83.7)	7 (16.3)		Ref	
Gender			.002		
Male	182 (74.3)	63 (25.7)		Ref	
Female	42 (54.5)	35 (45.5)		3.220	1.512– 6.858
Age			.066		
18–24	78 (62.9)	46 (37.1)		2.009	.997– 4.045
25–30	149 (72.7)	56 (27.3)		Ref	
Income			1.0		
<\$10,000	102 (69.9)	44 (30.1)			
$\geq$ \$10,000	120 (69.4)	53 (30.6)			
Education			.889		
$\leq$ High school/equivalent	102 (70.8)	42 (29.2)			
>High school	80 (72.1)	31 (27.9)			
Homeless	29 (65.9)	15 (34.1)	.367		
Employment			.782		
Unemployed	90 (70.3)	38 (29.7)			
Full or part-time	92 (72.4)	35 (27.6)			
STI			.698		
None	158 (69.6)	69 (30.4)			
One or more	67 (67.0)	33 (33.0)			
Average drinks per week			.582		
<4 drinks per week	135 (71.4)	54 (28.6)			
$\geq$ 5 drinks per week	11 (64.7)	6 (35.3)			
Depressive symptoms			.000		
None-mild	158 (77.8)	45 (22.2)		Ref	
Moderate-severe	16 (41.0)	23 (59.0)		3.555	1.255– 10.071
Suicidal ideation	24 (53.3)	21 (46.7)	.003	1.278	.514– 3.178
Anxiety symptoms			.004		
None-mild	142 (78.9)	38 (21.1)		Ref	
Moderate-severe	30 (57.7)	22 (42.3)		1.385	.537– 3.573
No condom use at last sex	31 (17)	1723.9	.287		
Number of partners within the last 3 months			.125		
One partner	104 (71.7)	41 (28.3)			
Two or more partners	83 (62.9)	49 (37.1)			

Note: Counts less than 5.

## **Sexual health indicators**

Nearly 60% reported condom use at last sex, 20% had had 1 sexual partner in the last 3 months, and 11% had 2 or more partners in the last 3 months. One-third of ( $n = 102$ ) of the sample had at least 1 STI diagnosis (gonorrhea, chlamydia, syphilis, trichomoniasis) within the last year and there were 193 total STI events. Of the 102 individuals with an STI, 47% had 2 STIs or more in the same time period.

## **Associations with viral load suppression**

The lack of viral suppression was associated with being African American or other minority, female, endorsing depressive symptoms, anxiety symptoms, and expressing suicidal ideation within the previous 2 weeks ( $p < .05$  for all). Individuals with moderate to severe symptoms of depression were 3.56 times (95% CI 1.26–10.07) more likely to be virally unsuppressed. Women had higher odds of having unsuppressed viral loads (3.220 OR, 95% CI 1.51–6.86). There were no significant differences between younger (18–24 years) and older (25–30) cohorts, with respect to viral suppression. Table 2 depicts these relationships.

## **Associations with having STIs**

Having a diagnosis of an STI in the previous 12 months was associated with being African American or other minority, having two or more partners, being male, and having used crack or cocaine in the past 30 days ( $p < .05$  for all). Reported methamphetamine/speed, heroin, and injected drug use all had cell counts of less than 5. Individuals, who had two or more partners within the past 3 months, were African American/other minorities, and male had higher odds of having more than one STI compared to those with no STI diagnosis. The independent factors associated with having any STIs were being African American or other minority (OR = 3.96, 95% CI 1.04–15.13) and having two or more sex partners (OR = 2.81, 95% CI 1.33–5.92). Table 3 shows these results.

## **Discussion**

The purpose of this study was to identify challenges that interrupt consistent care among young adults with HIV. A large proportion of the sample presented with undetectable viral load, yet those having unsuppressed viral loads were more likely to be African American, female, and endorsing moderate to severe symptoms of anxiety and depression. Additionally, having any STIs within the previous 12 months was independently associated with being African American and having 2 or more sex partners. These findings suggest additional focus on effectively addressing psychological distress symptoms and STI prevention efforts among African American and female patients are necessary.

To date, there have been several successful interventions focusing on mental health among young individuals with HIV (Murphy, Chen, Naar-King, & Parsons for the Adolescent Trials Network, [17]; Parsons, Lelutiu-Weinberger, Botsko, & Golub, [21]). Additional interventions and resources are needed though, as interventions that have shown to be effective have often relied upon having psychologists or trained mental health clinicians. With the transition to the

Affordable Care Act, there are likely to be challenges to continued comprehensive care that has been supported with Ryan White Care Act, namely HIV-related mental health care and case management (Patient Protection and Affordable Care Act, [22]).

**Table 3.** Bivariate and predictive sociodemographic associations with STI status.

	No STIs, n (%)	One or more STI, n (%)	p-Value	Adjusted odds ratio	95% CI
Race			.005		
African American/other minorities	192 (66.7)	96 (33.3)		3.964	1.039–15.127
Caucasian	39 (86.7)	6(13.3)		Ref	
Gender			.002		
Male	164 (65.6)	86 (34.4)			
Female	64 (84.2)	12 (15.8)			
Age			.327		
18–24	83 (65.9)	43 (34.1)			
25–30	148 (71.5)	59 (28.5)			
Income			.277		
<\$10,000	96 (65.8)	50 (34.2)			
≥\$10,000	127 (71.8)	50 (28.2)			
Education			.310		
≤High school/equivalent	102 (70.3)	43 (29.7)			
>High school	74 (66.7)	37 (33.3)			
Homeless	27 (61.4)	17 (38.6)	.284		
Employment			.686		
Unemployed	86 (67.2)	42 (32.8)			
Full or part-time	90 (70.3)	38 (29.7)			
Average drinks per week			.272		
<4 drinks per week	123 (64.7)	67 (35.3)			
≥5 drinks per week	13 (81.2)	3 (18.8)			
Moderate-severe depressive symptoms	24 (61.5)	15 (38.5)	.192		
Suicidal ideation	27 (60.0)	18 (40.0)	.112		
Moderate-severe anxiety symptoms	34 (65.4)	18 (34.6)	.366		
Receiving ART	214 (70.6)	89 (29.4)	.145		
HIV viral load			.698		
<200 copies/mL	158 (70.2)	67 (29.8)			
≥200 copies/mL	69 (67.6)	33 (32.4)			
CD4 cell count			.115		
<199 cells/mm <sup>3</sup>	27 (81.8)	6 (18.2)			
≥200 cells/mm <sup>3</sup>	204 (68.0)	96 (32.0)			
No condom use at last sex	33 (19.2)	15 (20.5)	.861		
Number of partners within the last 3 months			.041		
One partner	107 (73.8)	38 (26.2)		Ref	
Two or more partners	85 (62.0)	52 (38.0)		2.809	1.333–5.917

Note: Counts less than 5.

More in-depth research needs to be conducted to assess psychiatric needs among young adults with HIV to determine severity of the symptoms assessed and directionality of relationships between medication adherence and distress. Additionally, determining differences between diagnostic major depression disorder and generalized anxiety disorder as compared to symptoms of distress is imperative in order to develop and test appropriate interventions to address these symptoms. Furthermore, suicidality among this population needs to be explored more



thoroughly, as the proportion of the sample endorsing suicidal ideation was more substantial than previously reported in adult clinic populations (Lawrence et al., [14]). Previous studies have also demonstrated this disturbing trend among LGBT youth (Mustanski, Andrews, Herrick, Stall, & Schnarrs, [18]).

Specifically examining how African Americans experience this infection is imperative. Research continues to assess the high infection rates and call for continued focus on reducing infection rates among young African American men who have sex with men (YAAMSM). This study sample included all patients receiving HIV care who are 18–30 years old; most of which was YAAMSM. While engaged in care, there persists a need to develop effective interventions for care engagement and medication adherence to achieve undetectable viral loads to improve health outcomes and reduce transmission efficiency. To date, the CDC currently has only one effective intervention promoted for this population (CDC, [4]). It is clear from our data that interventions focused on improving mental health symptoms will be important to improving outcomes and reducing transmission rates among YAAMSM.

Additionally, women continue to experience HIV infection in a different manner as well. Previous research identified specific support services that were female-oriented (Gurung, Taylor, Kemeny, & Myers, [11]), yet younger patients may need different types of interventions, as they have unique needs (e.g., reproductive health) in managing their HIV infection.

While having a current diagnosis of an STI was not associated with viral suppression, it does suggest unprotected sexual behaviors resulting in exposure of both partners to HIV and/or other STIs. This finding suggests a limited reduction in engagement in sexual risk behaviors, regardless of engagement in HIV care or attaining an undetectable viral load. Thus, clarifying STI prevention messages among individuals with HIV, particularly those with unsuppressed viral loads and/or are not yet fully adherent to ART, is necessary to prevent ongoing transmission of HIV (Mayer et al., [15]; Powers, Poole, Pettifor, & Cohen, 2008). Future studies need to incorporate long-term follow-up to assess whether viral load continues to be suppressed even when cases of STIs exist, as research suggests increasing HIV viral loads in the presence of other STIs (Champredon et al., [6]).

One limitation to this study is that data were collected in only one clinic site. While these findings were specific to young adults with HIV who are engaged in care; yet these results offer opportunities to guide the development of interventions and further research directions. We utilized a cross-sectional measure of viral loads, understanding that there may be anomalies in this measure that are not related to adherence. Further, self-reported medication adherence was not measured and thus, could not be included in the analyses. To our knowledge, there were no systematic medication adherence interventions occurring at the same time, beyond the standard of care protocol, which includes having providers encourage patients take their medication daily. Longitudinal assessments of predictors of viral load suppression would provide more comprehensive results to offer detailed intervention opportunities related to mental health, ART adherence, and sexual health messaging.

Identifying and addressing youth-related issues in HIV care is imperative for transmission reduction and improving health outcomes among this population. In the era of promotion of

"Treatment as Prevention" and Pre-Exposure Prophylaxis, it is important to understand where significant barriers to medication adherence exist. As current guidelines recommend early ART for all patients with HIV, new adherence challenges will arise. Specifically, youth have not had personal experience with morbidity and mortality associated with untreated HIV infection resulting in reduced urgency of managing their HIV care. Thus, to improve outcomes among young adults with HIV, we must continue to evaluate factors associated with care engagement and long-term adherence to ART regimens in otherwise healthy youth.

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