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## Criminal justice involvement history is associated with better HIV care continuum metrics among a population-based sample of young Black men who have sex with men

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### Abstract

**Objective**—To examine how history of criminal justice involvement (CJI) is related to HIV care continuum metrics among young Black men who have sex with men (YBMSM) 16–29 years of age.

**Design**—Population-based survey

**Methods**—From 2013–2014 a representative sample of YBMSM was generated using Respondent Driven Sampling (RDS) in Chicago (n=618). HIV antibody/Ag and RNA testing were performed using dry blood spots. Factors assessed in the care continuum included HIV testing, HIV diagnosis, linkage-to-care within 6 months, retention-in-care, adherence to antiretrovirals, and viral suppression. RDS-weighted regression models examined the associations between history of CJI, including frequency of CJI and durations of stay and each of the continuum metrics.

**Results**—A final analytic sample of 618 participants was generated through RDS chains of up to 13 waves in length and with a mean of 2.1 recruits per participant. At enrollment, 40.8% had prior

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history of CJJ and 34.6% were HIV seropositive. Of persons reporting HIV seropositive status, 58.4% were linked to care, 40.2% retained in care, 32.2% adherent to antiretrovirals and 24.3% virally suppressed. Any CJJ history was associated with the overall care continuum (aOR, 2.35; 95% CI 1.13–4.88) and was most associated with increased retention-in-care (aOR 3.72 (1.77–7.84)). Having one CJJ experience and detention for only one day was associated with better retention-in-care compared to no or more frequent CJJ.

**Conclusions**—Those with a previous history of CJJ were more successful in achieving most HIV care continuum metrics. Frequent and cycling CJJ, however, was detrimental to HIV care.

## Introduction

HIV care continuum research that includes Black MSM has primarily utilized a disparities framework which compares Black MSM to a White MSM reference group [1, 2]. While this approach may suggest broad differences between these two populations, such analyses are unable to account for the marked heterogeneity within Black MSM communities [3–5]. In addition, existing studies have not adequately explored the role of criminal justice involvement (CJJ), which is higher among Black versus White MSM. Such CJJ might be related to the HIV care continuum [6]. Therefore, next generation analyses that move beyond a disparities framework can begin to illuminate factors and processes that are most amenable to intervention among Black MSM. Such an approach recognizes BMSM as a diverse group, and in particular younger Black MSM where prevention interventions are largely absent [7]. More specifically, in the context of CJJ, studies [8, 9] have demonstrated high rates of HIV transmission among criminal justice involved Black MSM. However, there is little understanding of how CJJ might be related to the HIV care continuum among YBMSM. Whether CJJ might benefit or detract from HIV care engagement is an important question that can have significant primary and secondary HIV intervention implications within this population, who are disproportionately burdened by staggering rates of CJJ and HIV incidence [8, 10].

In order to examine the relationship between CJJ and the HIV care continuum we use recent data from the uConnect cohort, a population-based sample of younger Black MSM 16–29 years of age. Because drivers of the HIV care continuum are poorly characterized among YBMSM, [11, 12] a population-based sample helps avoid some of the biases associated with samples of YBMSM based in clinics or jails, or other convenience samples, that would impact our understanding of factors most associated with the entire breadth of the HIV care continuum.

## Methods

### Sample Generation

Respondent Driven Sampling (RDS) was used to generate the uConnect cohort and estimation of population parameters from the data. Additional information regarding justification for RDS, population parameter estimates, weights computation of finite population correction, sensitivity analyses, implementation of RDS sampling and sourcing

of seeds has been previously described [13, 14] and is available in Supplementary Materials 1.0 – 3.0.

### **Data Collection: Eligibility Criteria**

Using an RDS approach, a baseline sample of eligible YBMSM was recruited in South Chicago and adjacent South suburbs between June 2013 and July 2014 [13]. This geographic area was sampled because it represents the largest region of highest HIV incidence in Chicago [15] and, as the most populous contiguous majority Black community area in the United States [16], provides the opportunity to generate a large sample with limited variation in environmental exposures [17]. Study respondents were eligible to be interviewed if they: 1) self-identified as African American or Black, 2) were born male, 3) were between 16 and 29 years of age (inclusive), 4) reported oral or anal sex with a male within the past 24 months, 5) resided in South Chicago or the adjacent South suburbs, and 6) were willing and able to provide informed consent at the time of the study visit.

### **HIV Care Continuum Measures**

HIV care continuum measures included HIV infected unaware, linkage to care, retention in care, adherence to antiretrovirals and viral suppression. HIV infection was determined by three assays applied to samples eluted from dry blood spot samples: ARCHITECT HIV Ag/Ab Combo, Multispot HIV-1/HIV-2 Bio-Rad, and Realtime HIV-1 RNA (Abbot). HIV-infected but unaware individuals were identified as clients who reported HIV negative status (or never tested), and who were found to be HIV seropositive. All clients found to be HIV-infected-but-unaware were reviewed and confirmed by a trained social worker following the study visit and corroboration with Department of Public Health surveillance records. Linkage to care, retention in care and adherence to antiretrovirals were based upon self-report. Multiple definitions of linkage to care exist [18–26]. In the uConnect cohort, linkage was defined as reporting at least one HIV medical care visit within 6 months after diagnosis. Retention in care was defined as reporting two or more appointments 90 days apart in the previous 12 months [27]. Viral load frequency measures of retention collected from Chicago Department of Public Health laboratory surveillance data was used to verify self-report, and was correlated (data not shown). Adherence to antiretrovirals was defined as self-report of missing HIV medications on fewer than 4 days in the previous month to be consistent with >85% adherence. Viral suppression was defined as having an HIV RNA <2000 nucleic acid (NA) copies/mL in whole blood (RealTime, Abbott).

### **Independent Variable Measures**

The variables selected for this study were informed by prior empirical considerations suggesting that racial disparities associated with HIV care continuum metrics were associated with sociodemographic, risk behavior, health, and social factors [28–32]. Additional information on these variables and CJI definitions can be found in Supplementary materials 1.0–4.0.

## Statistical Analysis

First, we assessed the bivariate relationships between each of the independent variables with our primary HIV care continuum outcomes using simple logistic regressions, giving us unadjusted bivariate odds ratios for each of the independent/outcome variable pairings. Next, we accounted for sociodemographic characteristics and preexisting situations that may affect one's place on the continuum in each of the logistic regressions to produce adjusted bivariate odds ratios. Our final comprehensive models included each HIV care continuum variable against the entire set of independent variables and controls. Significant associations between independent variables and HIV care continuum variables were assessed via the odds ratios in those final six multivariate logistic regression models ( $\alpha=0.05$ ). Joint p-values for the effect of each independent variable across the span of the HIV care continuum were calculated using techniques to adjust for overall effects in seemingly unrelated regressions [33].

Finally, to more clearly understand the association between the HIV care continuum and CJI, we substituted in total time served, average time served per detainment (days) and total number of separate detainments for the original dichotomous CJI variable in the final multivariate logistic regression models. All regression analyses were conducted using Stata 14 software [34].

## Results

A final analytic sample of 622 eligible participants was generated through RDS chains of up to 13 waves in length and with a mean of 2.1 recruits per participant. At enrollment, 71.1% of the sample was 24 years of age and under, 40.8% had prior history of CJI, 54.4% had health care coverage and 34.6% were HIV seropositive. Of those HIV seropositive, 58.4% had been linked to care within 6 months of diagnosis, 40.2% were retained in care, 32.2% were adherent to antiretrovirals and 24.3% were virally suppressed. uConnect cohort descriptives can be found in Supplementary Materials.

In adjusted analyses, CJI was associated with the overall HIV care continuum (aOR 2.35; 95% CI 1.13–4.88) including viral suppression (aOR 3.00; 95% CI 1.15–7.79). In addition several covariates were associated with each step in the HIV care continuum as demonstrated in Table 1. Length and frequency of CJI was also associated with care continuum metrics albeit in a more nuanced way (Figure 1).

## Discussion

There are several new and important findings from these analyses. First, we documented that CJI YBMSM versus those with no such histories are more likely to be successfully engaged in the HIV care continuum. These findings were robust across a variety of HIV care continuum stag. A critical caveat to these findings is that there are competing forces between total days spent per detention and frequency of detention episodes. Repeated episodes of CJI resulted in worse HIV care engagement across a number of measures, yet longer stays were associated with better HIV care engagement across all HIV care continuum measures. Frequent and recurrent cycling within the criminal justice system has also been reported by others as a risk factor for ongoing HIV risk and transmission [35, 36]. It is unclear from our

analysis whether frequent cycling of YBMSM in and out of CJI is a symptom of other social factors that limit HIV care engagement, or whether repeated CJI is disruptive to maintaining engagement with HIV care.

Our finding of the association between longer CJI stays and improved HIV care engagement substantiates those of prior studies which have documented that CJI is associated with improved HIV care continuum metrics. A recent systematic review suggests that HIV care continuum measures such as achievement of viral suppression were highest during the incarcerated period [37]. The review also highlights that following incarceration, criminal justice involved populations are less likely to engage in the HIV Care Continuum and at slightly lower rates to those engaged prior to incarceration. Our findings extend those of earlier studies by characterizing the nuance of HIV care engagement based upon the frequency of exposure and duration of CJI. Some of the differences in our study may be due to several factors including that the majority of studies in the systematic review were focused on prison populations that included both men and women sexual identity was rarely reported, and race/ethnicity was not assessed. Clearly, the association between duration of CJI and HIV care engagement is of concern and may reflect the poor HIV care engagement infrastructure outside of jails in communities of color.

The current study also finds that having a “mother figure” is an important factor related to improved care continuum metrics. It may be that having important kin relationships is associated with better care outcomes, although having a mother figure did not modify the findings when added to the model. Previous work has shown that family in the lives of YBMSM matters with respect to HIV testing and other HIV related risk behaviors [38, 39]. Relatedly, network interventions have been found to be effective including group-level interventions [40], which may hold promise for improving the HIV care continuum [41].

In summary, this analysis of the YBMSM care continuum highlights the nuanced nature of CJI’s possible impacts on the HIV care continuum. Understanding these nuances was possible because we moved away from an examination of disparities that compares White to Black MSM, and instead focused on the heterogeneity within YBMSM communities. While CJI systems may be good for HIV care retention, its overall social role is likely very negative, especially considering outcomes that go beyond public health (police brutality, disruption of community lives, lack of opportunity upon release, etc). In addition, while limiting criminalization of YBMSM may reduce risk of HIV, the criminal justice system is structured to implement many steps of the HIV continuum, including testing and treatment which may engage some in care even post-release. However, frequent and cycling CJI was associated with less care engagement and may reflect disruptions in HIV care engagement or represents other structural factors that would limit care engagement. Consequently, forming more coordinated joint partnerships with criminal justice systems, departments of public health and other community based initiatives are needed to improve the HIV continuum for YBMSM.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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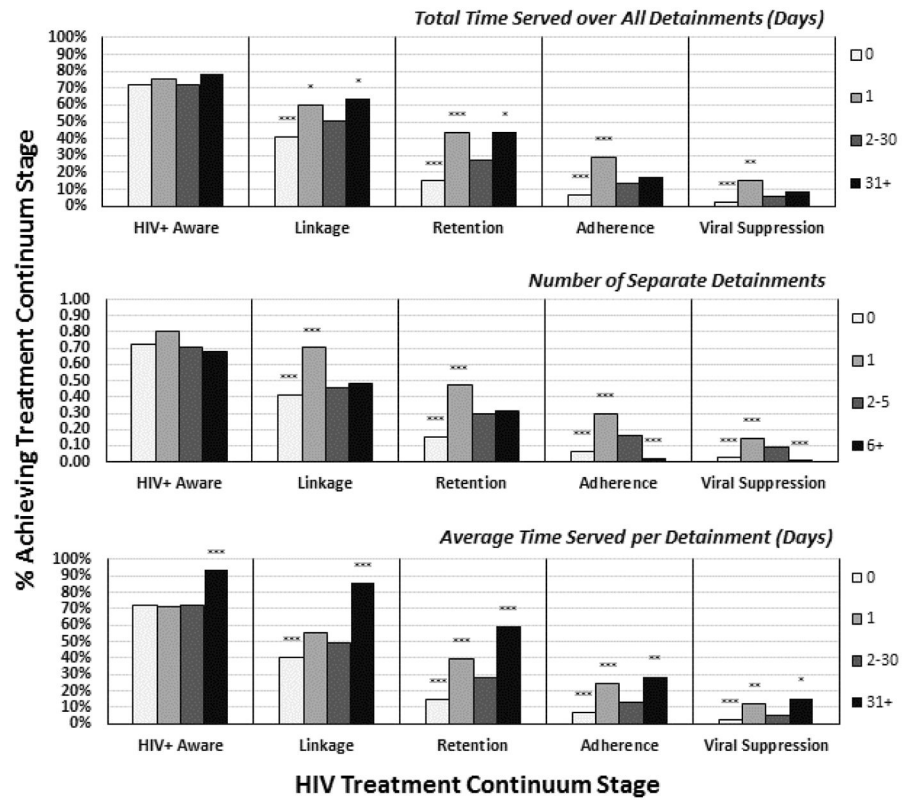
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**Figure 1.** Adjusted estimates of HIV Treatment Continuum success by length and frequency of criminal justice detention, uConnect 2013–2014 (n=214)  
 \*p<0.05; \*\*p<0.01; \*\*\*p<0.001

Multivariable logistic regression models of potential HIV Care Continuum drivers among a population-based sample of younger black MSM, uConnect 2013–2014

Table 1

HIV Care Continuum Drivers <i>Odds Ratio (95% CI)</i>	Serostatus <i>N=618</i>	HIV+ Aware <i>N=214</i>	Linked to Care <i>N=214</i>	Retained in Care <i>N=214</i>	Adherence to ARVs <i>N=214</i>	Viral Suppress <i>N=214</i>
<b>Social Factors</b>						
Criminal justice involvement	2.24 (1.28–3.94)**	1.57 (0.63–3.87)	3.20 (1.10–9.36)*	3.72 (1.77–7.84)**	2.52 (1.30–4.89)**	3.00 (1.15–7.79)
Have a mother/mother figure	0.58 (0.24–1.36)	4.33 (1.24–15.13)*	1.16 (0.50–2.72)	1.28 (0.42–3.88)	0.98 (0.34–2.87)	2.31 (0.71–7.4)
Open about sexual identity	0.79 (0.41–1.55)	3.52 (1.07–11.57)*	1.85 (0.55–6.28)	1.90 (0.51–7.16)	1.18 (0.32–4.31)	1.36 (0.31–5.9)
House/Ball or gay family member	1.51 (0.94–2.45) <sup>†</sup>	1.22 (0.53–2.81)	0.79 (0.43–1.44)	1.35 (0.51–3.55)	1.34 (0.49–3.66)	0.83 (0.25–2.8)
Closeness to Black community	0.82 (0.46–1.46)	0.75 (0.18–3.03)	2.58 (0.59–11.33)	0.63 (0.19–2.09)	0.53 (0.14–1.95)	0.52 (0.15–1.7)
Ever witness to violent assault(s)	0.68 (0.36–1.30)	0.52 (0.18–1.52)	1.09 (0.44–2.69)	0.95 (0.44–2.10)	0.54 (0.28–1.05) <sup>†</sup>	1.50 (0.76–2.9)
<b>Sociodemographics</b>						
Age (Years)						
16–18	0.12 (0.02–0.57)**	7.08 (1.84–27.24)**	0.33 (0.08–1.48)	0.40 (0.07–2.23)	0.14 (0.01–1.67)	0.16 (0.01–2.1)
19–20	0.19 (0.09–0.42)***	2.18 (0.43–11.00)	6.33 (1.23–32.61)*	0.93 (0.30–2.90)	0.98 (0.30–3.23)	0.34 (0.11–1.05)
21–24	0.43 (0.25–0.75)**	1.29 (0.50–3.34)	1.13 (0.40–3.16)	0.82 (0.43–1.55)	0.53 (0.20–1.42)	0.42 (0.14–1.2)
25+	1.00	1.00	1.00	1.00	1.00	1.00
Education						
Less than high school	0.94 (0.51–1.75)	1.47 (0.39–5.61)	1.32 (0.55–3.15)	1.72 (0.50–5.91)	1.94 (0.49–7.61)	4.45 (1.03–19.2)
High school or equivalent	1.00	1.00	1.00	1.00	1.00	1.00
Some college or higher	1.07 (0.68–1.68)	2.17 (0.86–5.44) <sup>†</sup>	1.17 (0.53–2.55)	0.89 (0.41–1.93)	0.73 (0.32–1.63)	0.71 (0.26–1.9)
Identifies as gay	3.10 (1.34–7.19)**	1.89 (0.48–7.41)	1.99 (0.74–5.36)	0.98 (0.47–2.03)	0.82 (0.37–1.84)	0.64 (0.23–1.8)
Current employment						
Unemployed	1.00	1.00	1.00	1.00	1.00	1.00
Full time	0.63 (0.36–1.10)	2.01 (0.64–6.29)	0.80 (0.33–1.93)	1.12 (0.32–3.86)	0.62 (0.17–2.25)	0.53 (0.17–1.6)
Part time	0.85 (0.43–1.68)	1.02 (0.42–2.51)	0.60 (0.26–1.36)	1.32 (0.62–2.82)	1.59 (0.72–3.49)	1.63 (0.66–4.0)
Housing instability in past year	1.08 (0.64–1.80)	1.27 (0.45–3.59)	0.33 (0.12–0.89)*	0.70 (0.28–1.77)	0.95 (0.33–2.70)	1.09 (0.42–2.7)
<b>Behavior &amp; Health</b>						

HIV Care Continuum Drivers <i>Odds Ratio (95% CI)</i>	Serostatus N=618	HIV+ Aware N=214	Linked to Care N=214	Retained in Care N=214	Adherence to ARVs N=214	Viral Suppress N=214
Drug use in past year	1.64 (1.03–2.60) <sup>*</sup>	2.12 (0.80–5.64)	1.21 (0.49–3.02)	1.72 (0.80–3.68)	0.98 (0.37–2.59)	1.09 (0.37–3.2)
Health care coverage	1.46 (0.96–2.21) <sup>†</sup>	9.86 (4.19–23.22) <sup>***</sup>	10.00 (3.97–25.19) <sup>***</sup>	5.24 (2.27–12.05) <sup>***</sup>	6.60 (3.02–14.39) <sup>***</sup>	6.14 (2.59–14.55)
Psychological distress	0.93 (0.53–1.63)	4.10 (0.55–30.49)	2.92 (1.02–8.35) <sup>*</sup>	0.91 (0.26–3.19)	0.66 (0.14–3.18)	0.46 (0.07–2.9)
Years since HIV diagnosis	Excluded <sup>b</sup>	Excluded <sup>b</sup>	1.14 (0.98–1.32) <sup>†</sup>	1.09 (0.99–1.20) <sup>†</sup>	1.07 (0.97–1.18)	1.06 (0.96–1.1)

<sup>†</sup> p<0.10;

<sup>\*</sup> p<0.05;

<sup>\*\*</sup> p<0.01;

<sup>\*\*\*</sup> p<0.001

ARVs, antiretrovirals; CI, confidence interval; MSM, men who have sex with men; TasP, treatment as prevention.

<sup>a</sup> Ordinal variable giving the highest stage each respondent reached in the HIV Care Continuum.

<sup>b</sup> Excluded from model due to dependence on the outcome variable