


The Role of the Primary Romantic Relationship in HIV Care Engagement Outcomes Among Young HIV-Positive Black Men Who Have Sex with Men

Judy Y. Tan¹  · Lance Pollack¹ · Greg Rebchook¹ · John Peterson² · David Huebner³ · Agatha Eke⁴ · Wayne Johnson⁴ · Susan Kegeles¹

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Abstract The primary romantic relationship plays a fundamental role in health maintenance, but little is known about its role in HIV care engagement among young Black men who have sex with men (MSM) living with HIV. We examined how HIV care engagement outcomes (i.e., having a primary healthcare provider, receiving HIV treatment, taking antiretroviral medication, and medication adherence) vary by partnership status (single vs. concordant-positive vs. discordant) in a sample of young Black MSM living with HIV. Results showed mixed findings. Partnership status was significantly associated with HIV care engagement, even after adjusting for individual, social, and structural factors. While partnered men were consistently more likely than their single counterparts to have a regular healthcare provider, to receive recent treatment, and to have ever taken antiretroviral medication, they were less likely to report currently receiving antiretroviral therapy. Moreover, men with a discordant partner reported better adherence compared to men with a concordant or no partner. The association between partnership status and HIV care engagement outcomes was not

consistent across the stages of the HIV Care Continuum, highlighting the complexity in how and why young Black men living with HIV engage in HIV healthcare. Given the social context of HIV disease management, more research is needed to explicate underlying mechanisms involved in HIV care and treatment that differ by relational factors for young Black MSM living with HIV.

Keywords Young Black MSM living with HIV · Primary romantic relationship · Partner serostatus · HIV care engagement

Introduction

Engagement in HIV care is critical for reducing transmission and morbidity [1, 2], yet we know little about factors associated with outcomes of HIV care engagement among young Black men who have sex with men (MSM). Increases in HIV incidence are largely driven by increases among young Black MSM [3]. Relative to any other racial/ethnic groups of MSM, young Black MSM living with HIV fare worse in terms of HIV care engagement, which includes having a primary healthcare provider, currently receiving HIV care and treatment, ever received antiretroviral therapy (ART), currently receiving ART, and ART adherence [4–8]. Evidence on relevant factors in HIV care engagement for young Black MSM is limited and urgently needed to guide efforts to enhance treatment outcomes and reduce racial disparities in the HIV Care Continuum [6, 9].

Few studies have focused specifically on HIV care engagement in the context of the primary relationship [10–14]. The lack of published studies in this area is surprising for several reasons. First, the primary relationship

✉ Judy Y. Tan
judy.tan@ucsf.edu

¹ Division of Prevention Science, Department of Medicine, Center for AIDS Prevention Studies, University of California, 550 16th Street, 3rd Floor, 0886, San Francisco, CA 94158-2549, USA

² Department of Psychology, Georgia State University, Atlanta, GA, USA

³ Department of Psychology, University of Utah, Salt Lake City, UT, USA

⁴ Division of HIV/AIDS Prevention, Centers for Disease Control and Prevention, Atlanta, GA, USA

has been shown to play a critical role in the outcomes of other chronic diseases like cancer [15], presumably through processes of close relationships [16] and social support [16–18]. Second, the primary relationship appears to be an important context for understanding HIV-risk particularly among MSM [19]. Third, the primary relationship can be an important component of resiliency that facilitates HIV care engagement for young Black MSM living with HIV [20, 21].

Despite limited research, extant evidence with various populations suggests that the primary romantic relationship is important to outcomes of HIV testing, HIV care retention, ART adherence, and viral suppression [22–29]. For example, couples HIV-testing among serodiscordant couples has been found to be acceptable [30]. A couples-based intervention that focused on the primary romantic relationship showed efficacy in enhancing retention in HIV care and treatment [26]. Better ART adherence was associated with patients' positive evaluation of the primary relationship, as well as the partner's belief in treatment efficacy [24]. The primary partner's report of increases in patient's ART adherence was found to be significantly associated with patients' viral suppression [31]. Finally, in a sample of serodiscordant couples, a higher level of relational orientation (i.e., the inclusion of the partner in one's own self-concept) in both partners was independently and positively associated with viral suppression in the partner living with HIV [29]. These studies altogether suggest the important role of the primary romantic relationship in HIV care engagement outcomes. However, none of these studies on the primary relationship specifically focused on young Black MSM and the myriad social and structural factors that impede optimal outcomes for young Black MSM living with HIV.

Individual risk-associated behaviors do not explain racial HIV disparities for young Black men [32, 33]. Instead, a confluence of social and structural factors sustains racial HIV disparities, and sexual partnership patterns may be fueling the epidemic among young Black MSM living with HIV. Sexual partnerships, combined with sub-optimal treatment outcomes related to social and structural barriers in the HIV Care Continuum, confer a higher probability of exposure to HIV to sustain the high prevalence and incidence rates among young Black MSM living with HIV [34–36]. However, the importance of the primary romantic relationship vis-à-vis social and structural barriers to HIV care for young Black MSM living with HIV remains unknown.

To date, no study has focused specifically on young Black MSM living with HIV to examine the significance of the primary relationship across the HIV Care Continuum. Thus, our goal is to determine whether having a primary romantic relationship or not, as well as partner serostatus

(HIV-concordant vs. HIV-discordant), is related to HIV care engagement outcomes (i.e., having a primary health-care provider, currently receiving HIV healthcare, ever received ART, currently receiving ART, and ART adherence) in a sample of young Black MSM living with HIV in the context of relevant social and structural barriers to optimal HIV care and treatment.

Methods

Sample and Procedures

Data for analysis were collected as the baseline in an efficacy trial of a community-level HIV prevention intervention for young Black MSM in Dallas and Houston, TX, between 2009 and 2014. The intervention focused on primary prevention; secondary prevention and engagement in HIV healthcare were not addressed by any intervention activities. Six independent cross-sectional surveys, approximately a year apart, were collected in each community to establish a baseline prior to implementation of the intervention. Men met survey eligibility criteria if they were between the ages of 18 and 29, identified as Black or African American, reported sex with another man in the past 12 months, were fluent in English, and lived in either the Dallas or Houston metropolitan areas. For the six cross-sectional surveys combined, 3578 young Black MSM met the inclusion criteria. Of these, 352 (10 %) young Black MSM who self-reported having tested HIV-positive from either Dallas or Houston were included in the present analysis (50 men who participated in more than one survey were only included once, i.e., data from subsequent survey[s] were not used).

Participants were recruited using a modified venue-based time-location sampling protocol modeled after that used for the National HIV Behavioral Surveillance Survey [37], and adapted based on pilot work that established its feasibility in recruiting young Black MSM in these specific communities [38, 39]. Venues included bars, dance clubs, retail establishments, restaurants and cafés, adult bookstores, bathhouses, high-traffic street locations, parks, and other locations of social or religious organizations. Venues where health and/or prevention services were provided, including HIV or other sexually transmitted infection testing, were excluded from the sampling frame. Modifications to the sampling protocol were made: (a) because of cost considerations, at least eight young Black MSM had to enter a venue during a 2 h period for the venue to be included as a sampling location, and (b) venues and sampling periods were selected to maximize representation and efficiency in sampling for a 4 h sampling time frame.

Trained study interviewers approached and screened potential participants who entered a predefined intercept

area at each sampling venue. Eighty-eight percent of men who were approached agreed to eligibility screening, and 70% of those men screened eligible completed the survey. Surveys took about 20–30 min to complete. Participants were compensated \$30 for completing any portion of the survey. All study procedures were approved by the institutional review board at the home institution of the principal investigator, the data collection subcontractors in Dallas and Houston, and the Centers for Disease Control and Prevention.

Measures

The survey measures included demographic characteristics, self-reported HIV serostatus, length of time since HIV diagnosis, and HIV care engagement. Given the importance of social and structural factors in the HIV-related outcomes among Black MSM, we included the following sociostructural variables in our analysis: educational attainment, employment status, annual income, incarceration history, homelessness, and self-identification as gay. Primary relationship status with a man was ascertained by the survey item, *Do you currently have a boyfriend/lover (a male you feel committed to and who you have sex with)?* These participants were also asked to report their partner's HIV serostatus. HIV-discordance refers to a relationship in which the primary romantic partner is HIV-negative.

HIV care engagement was assessed using the following items that corresponded with linkage, retention, ART uptake, and adherence stages in the HIV Care Continuum, rated on a binary, *Yes/No*, scale: (a) *Do you have a primary healthcare provider (someone you see regularly for HIV-related healthcare)?*; (b) *Have you received any healthcare or treatment for HIV in the past six months i.e., currently receiving healthcare* (c) *Have you ever taken any HIV medicines prescribed by a doctor?*; (d) *Are you currently taking any HIV medicine* [2]. Participants were also asked, *In the past 30 days, how often did you miss taking a dose of any of your HIV medicine(s)* rated on a 1–5 Likert-type scale (1, *Never*, to 5, *Very Often*) later dichotomized into, *Never* (i.e., No Missed Doses reported) and all other responses (i.e., Missed Doses reported) for consistency in analyses across items. To preserve meaningful comparisons [2], each item included only those participants who reported, *Yes* to the previous item (e.g., only men who reported *Yes* to currently taking any HIV medicine were considered in the analysis of the subsequent item on medication adherence).

Data Analysis

There were two analysis goals. We first examined whether there were differences in HIV care engagement between

men who were *Single*, men with a *Concordant* partner, and men with a *Discordant* partner. Simple logistic regression models were conducted to estimate the odds of HIV care engagement with 95% confidence intervals (CIs) to further describe the size of the estimates.

First, we examined the HIV care engagement outcomes by a three-category partnership status variable (Single, HIV-Concordant, and HIV-Discordant). Next, we dichotomized the partnership status variable (Single or in a relationship) to better indicate where the largest differences were found on the first four of the five HIV care engagement outcomes. For the last outcome (No Missed Doses), we dichotomized the partnership variable into men who had a discordant partner versus not, since the largest difference was observed between men with a discordant partner and men who were either single or had a concordant partner.

Second, we examined whether partnership-based differences in HIV care engagement would persist upon adjusting for the effects of sociostructural and individual factors important in HIV-related outcomes for young Black MSM. As suggested by a social epidemiological framework [40], sociostructural factors include educational attainment, employment status, income, history of incarceration, history of homelessness, and sexual orientation, and individual factors include age, city, year of data collection, and time since HIV diagnosis [41].

Results

Sample Characteristics

Of the 350 men who reported their relationship status, 48.9% (171) reported not having a primary romantic relationship partner; 30.3% (106) reported having a HIV-concordant partner; and 20.8% (73) had a HIV-discordant partner (Table 1). Among the men with a primary romantic partner, mean relationship duration was 29.52 months ($SD = 36.54$, interquartile range = 4–40; Table 1). Engagement in the HIV care and treatment did not differ between city and year (across the six annual cross-sectional assessments), and fluctuations in self-reported HIV prevalence over time were not statistically significant.

Of the sample of 352 young Black MSM living with HIV, 86.6% (304) reported having a primary healthcare provider, 81.8% (288) reported currently receiving HIV healthcare, and 67.6% (238) reported that they had ever received ART. Of the 238 men who had ever received ART, 70.6% (168) reported that they were currently receiving ART. Of the 168 men who reported that they were currently receiving ART, 52.4% (88) reported adhering to their HIV medication regimen (i.e., not having missed a dose in the past 30 days).

Table 1 Demographic characteristics and HIV care engagement outcomes of young Black men who have sex with men living with HIV in Dallas and Houston, Texas, 2009–2014

Variable	Categories	n ^a	%	M	SD
Relational					
Partnership status (<i>n</i> = 350)	Single	171	48.9		
	In a primary relationship	179	51.1		
	concordant-positive	106	59.2		
	Discordant	73	40.8		
Individual					
Age (<i>n</i> = 352) (years)				24.6	2.9
	18–20	30	8.5		
	21–23	104	29.5		
	24–26	106	30.1		
	27–29	112	31.8		
City	Dallas	173	49.1		
	Houston	179	50.9		
Survey wave	2009	52	14.8		
	2010	66	18.8		
	2011	55	15.6		
	2012	59	16.8		
	2013	58	16.5		
	2014	62	17.6		
Time Since HIV Diagnosis (<i>n</i> = 339)				37.9	39.1
	0–12 months	111	32.7		
	13–24 months	47	13.9		
	25–60 months	105	31.0		
	>5 years	76	22.4		
Sociostructural					
Educational attainment (<i>n</i> = 348)	Grade 11 or less	70	20.1		
	Grade 12 or GED	103	29.6		
	>Grade 12	175	50.3		
Employment status (<i>n</i> = 350)	Full-time	177	50.6		
	Part-time	67	19.1		
	Unemployed or disabled	106	30.3		
Annual income (<i>n</i> = 347)	<\$10,000	118	34.0		
	\$10,000–\$19,999	49	14.1		
	\$20,000–\$39,999	109	31.4		
	\$40,000 or more	71	20.5		
Incarceration (<i>n</i> = 343)	In past year	70	20.4		
	>1 year ago	49	14.3		
	Never	224	65.3		
Homelessness (<i>n</i> = 346)	In past year	50	14.5		
	>1 year ago	31	9.0		
	Never	265	76.6		
Sexual orientation (<i>n</i> = 352)	Gay-identified	285	81.0		
	Other-identified	67	19.0		

^a *n* may be less than 352 due to missing data by survey item

M mean, *SD* standard deviation

Main Findings

We examined bivariate relationships for each of the five HIV care engagement outcomes with a three-category partnership status variable (Single, HIV-Concordant, and HIV-Discordant; Table 2) and then by a two-category partnership status variable (Table 3). Simple logistic regressions revealed that men with a primary romantic partner were more likely than single men to report having a regular healthcare provider, currently receiving healthcare, and having ever received ART. Among participants who had ever received ART, single men were more likely to report *currently* receiving ART than men with either a concordant or a discordant partner. In terms of ART adherence among men currently on ART, men with a discordant romantic partner were more likely to report perfect adherence, that is, not missing any doses in the past 30 days relative to men who were single or who had a concordant romantic partner. Single men did not significantly differ from partnered men on adherence; however, ART adherence among single men was more similar to men with a concordant partner than to men with a

discordant partner. In other words, on the first four of the five outcomes, the largest difference was observed between single versus partnered men, whereas on the last outcome of ART adherence, the largest difference was observed between men with a discordant partner versus all other men (Fig. 1).

Adjusting for the effects of individual and sociostructural factors, we found that partnered men were more likely than their single counterparts to have a regular healthcare provider, to receive current HIV care, and to have ever received ART (Table 3). However, the association between having a primary romantic partner and HIV care engagement outcomes was not consistent across the HIV Care Continuum. While partnered men appeared to be better engaged than single men in an earlier stage of HIV care and treatment, they actually reported worse outcomes in later stages: Partnered men were less likely to report current ART compared to single men. On the measure of current ART, men with a *discordant* partner were more likely to report perfect adherence than either single men or men with a concordant partner; this pattern approached statistical significance in both bivariate and multivariate analyses.

Table 2 HIV Care engagement by relationship and partnership status (Single, concordant-positive, discordant) among young Black men who have sex with men living with hiv in Dallas and Houston, Texas, 2009–2014

Outcome	Total <i>n</i> (% Yes)	By partnership status		Simple logistic regression			
		<i>n</i>	% Yes	OR	95 % CI	<i>p</i>	
Have a regular healthcare provider ^a	349 (88.2)	Single	171	81.3	1.00		
		Concordant	105	91.4	2.46	1.12–5.38	.05
		Discordant	73	91.8	2.57	1.03–6.45	.05
Currently receiving hiv care ^b	350 (83.7)	Single	171	76.6	1.00		
		Concordant	106	86.8	2.01	1.03–3.90	.05
		Discordant	73	87.7	2.17	0.99–4.75	.10
Ever received ART ^c	350 (69.3)	Single	171	60.8	1.00		
		Concordant	106	74.5	1.89	1.11–3.22	.05
		Discordant	73	72.6	1.71	0.94–3.11	.10
Currently receiving ART ^d	236 (68.6)	Single	104	86.5	1.00		
		Concordant	79	57.0	0.21	0.10–0.42	.001
		Discordant	53	62.3	0.26	0.12–0.57	.01
ART Adherence (No Missed Doses past 30 days) ^e	168 (54.1)	Single	90	51.1	1.00		
		Concordant	45	44.4	0.77	0.37–1.57	<i>ns</i>
		Discordant	33	66.7	1.91	0.83–4.40	<i>ns</i>

n may be less than 352 due to missing data by survey item

OR odds ratio, AOR adjusted odds ratio, CI confidence interval, ART antiretroviral therapy

^a Discordant versus concordant 1.05 (0.36–3.08)

^b Discordant versus concordant 1.08 (0.44–2.65)

^c Discordant versus concordant 0.91 (0.46–1.78)

^d Discordant versus concordant 1.25 (0.61–2.54)

^e Discordant versus concordant 0.54 (0.98–6.35)

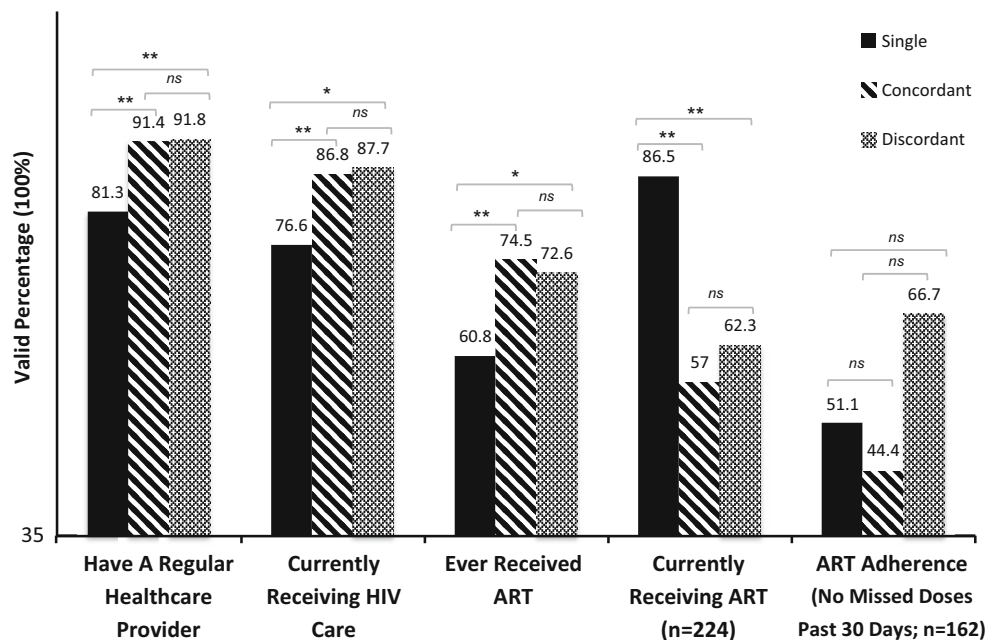
Table 3 HIV Care engagement by relationship and partnership serostatus (single, in a relationship) among young Black men who have sex with men living with hiv in Dallas and Houston, Texas, 2009–2014

Outcome	Partnership status	Simple logistic regression			Multiple logistic regression		
		OR	95 % CI	p	AOR	95 % CI	p
Have a regular healthcare provider	Single	1.00			1.00		
	In a relationship (concordant/discordant)	2.50	1.30–4.81	.005	2.58	1.20–5.54	.02 ^a
Currently receiving HIV care	Single	1.00			1.00		
	In a relationship (concordant/discordant)	2.07	1.18–3.64	.01	2.21	1.14–4.29	.02 ^b
Ever received ART	Single	1.00			1.00		
	In a relationship (concordant/discordant)	1.81	1.15–2.85	.01	1.70	1.01–2.88	.05 ^c
Currently receiving ART	Single	1.00			1.00		
	In a relationship (concordant/discordant)	0.23	0.12–0.44	<.001	0.36	0.17–0.79	.01 ^d
ART adherence (No Missed Doses past 30 days)	Single/concordant	1.00			1.00		
	Discordant	2.09	0.94–4.65	.06	2.45	0.94–6.38	.07 ^e

OR odds ratio, AOR adjusted odds ratio, CI confidence interval, ART antiretroviral therapy

- ^a n = 325, Hosmer–Lemeshow goodness of fit test p-value = 0.34
- ^b n = 326, Hosmer–Lemeshow goodness of fit test p-value = 0.89
- ^c n = 326, Hosmer–Lemeshow goodness of fit test p-value = 0.74
- ^d n = 224, Hosmer–Lemeshow goodness of fit test p-value = 0.52
- ^e n = 162, Hosmer–Lemeshow goodness of fit test p-value = 0.25

Fig. 1 Bivariate associations among HIV Care engagement outcomes among single men, men with a concordant-positive partner, and men with a HIV-discordant partner from a sample of young, Black men who have sex with men living with hiv in Dallas and Houston, Texas, 2009–2014. Note: ******p ≤ .05; *****p ≤ .10; **ns** statistically non-significant, ART antiretroviral therapy



Tables 4, 5, 6, 7 and 8 in Appendices 1–5 show the full simple and multiple logistic regression models with covariates for each of the five outcomes. In the multi-variable analyses, no covariate was statistically significant

in the presence of Partnership Status except for the outcome, Ever Received ART (Appendix 3), for which time since HIV diagnosis remained a statistically significant covariate.

Discussion

The present study examined the association between having a primary romantic relationship, partner serostatus, and HIV care engagement outcomes in a sample of young Black MSM living with HIV. Results also showed that HIV care engagement outcomes varied meaningfully by partnership status even after controlling for the effects of individual and sociostructural factors. The primary relationship was associated with better engagement in some HIV care engagement outcomes, but not all. In fact, having a primary romantic partner was associated with *worse* HIV care engagement in terms of current ART, on which single men appeared better engaged. Partner serostatus was also associated with HIV care engagement, such that men with a HIV-discordant primary romantic partner were relatively better at adhering to ART than either single men or men with a HIV-concordant partner. These findings fill a knowledge gap on the importance of the relational context in HIV care engagement, and is the first to do so that focuses on young Black MSM living with HIV.

Over half of the men in our sample reported having a primary romantic partner. In terms of having a healthcare provider, receiving HIV healthcare, and ever received ART, partnered men were better engaged, whereas in terms of currently receiving ART and ART adherence, single men were better engaged. Having a primary romantic partner potentially offers important instrumental as well as emotional support for the HIV-positive partner that enhance his engagement in HIV care and treatment [23, 28]. Notably, the opportunity to engage in dyadic HIV care wherein both HIV-positive partners are involved in each other's care (e.g., accompanying each other to appointments, establishing routines) may facilitate positive relationship dynamics that enhance HIV care outcomes for both partners, particularly when they make HIV care engagement an explicit relationship goal [21, 27].

Partner serostatus appeared to be an important component of HIV care engagement in this study. Men with a *discordant* partner were more likely to report perfect ART adherence than men with a concordant partner or no partner; this pattern approached statistical significance in both bivariate and multivariate analyses. Behavioral risk studies with MSM suggest that, at least among men with a primary romantic partner, fear of transmitting HIV to one's HIV-negative partner, to whom they are committed, may drive ART adherence to achieve viral suppression [42]. That is, men in a discordant relationship may be more motivated and committed to stay adherent than men who are not in a relationship and men in a concordant-positive relationship, where one's partner is already HIV-positive [42].

Our study findings should be understood in the context of sociostructural factors that produce suboptimal HIV care engagement outcomes among young Black MSM living with HIV. While the majority of the young Black MSM living with HIV in our study had a healthcare provider and received current HIV care, more than a third had never received ART. Of the men who reported past ART, a third were *not currently* receiving ART. Of the men who were currently receiving ART, only about half reported perfect ART adherence. In order to reduce racial HIV disparities, HIV care engagement interventions must consider sociostructural factors that produce suboptimal HIV care engagement outcomes among young Black men living with HIV in conjunction with proximal factors at the dyadic and individual levels [11, 43].

Although we explored HIV care engagement outcomes only by partnership status rather than relationship dynamics, partnership status may be an indicator of the presence or absence of dynamics and resources involved in social support. For instance, the presence of a relationship partner can be a source of tangible, instrumental support specific to HIV care (e.g., medication organization and monitoring, transportation to medical providers, reminders about appointments) [23] as well as emotional support (e.g., adaptive stress and coping strategies) [20, 44]. By showing the associations between partnership status and HIV care engagement outcomes, our study is among the first to address a gap in the literature on HIV care engagement in the context of the primary romantic relationship.

Limitations

It is important to note that HIV status may be under-reported due to men being unaware of their seropositivity. Moreover, social desirability biases may have skewed participants' responses on HIV care engagement. We attempted to address underreporting and social desirability effects by making the survey anonymous and using self-administered surveys (CASI) so the person administering the survey did not see individual responses.

Due to the cross-sectional study design of the study, we cannot infer causality. However, our goal was descriptive in nature. We aimed to describe patterns of HIV care engagement among young Black MSM living with HIV vis-à-vis partnership status. Our small sample size may contribute to diminished power to detect meaningful differences, particularly given marginal statistically significant results in the our ART adherence outcome. Also, our analysis was based on two cities in Texas; thus, our results are not generalizable to the US population of young Black MSM living with HIV.

Future Research and Implications for Enhancing HIV Engagement in Care

Engagement in the HIV Care Continuum in the current sample was less than optimal: In terms of past and current ART and adherence, a third to half of the men were less than optimally engaged, respectively. Because of existing racial disparities in HIV prevalence, increases in testing and linkage among young Black MSM living with HIV would not eliminate racial HIV disparities [9, 45]. Therefore, interventions for enhancing access and adherence to ART for young Black MSM living with HIV should be developed as part of the concerted effort to reduce racial HIV disparities.

Indeed, racial disparities in HIV exist at multiple levels of analysis—including at the dyadic level [11]. Understanding and remediating racial disparities in HIV care engagement and treatment among young Black MSM living with HIV require a multilevel approach that captures the complex ways in which individual behaviors, relationship dynamics, community and sociostructural factors interact to produce and perpetuate these disparities [11, 43, 46]. Analyses using multilevel modeling and the actor-partner interdependence model (APIM) can advance our understanding of multilevel factors in HIV care engagement among young Black MSM living with HIV [47].

HIV care engagement is multiply influenced. More work is needed to delineate the processes by which these factors predict HIV care engagement and in order to inform interventions aimed at improving HIV care engagement among young Black MSM. The present study suggests different mechanisms underlying HIV care engagement between men with concordant and discordant primary romantic partners. For example, fear of infecting one's partner may be an impetus for adhering to ART [28, 48, 49], but more research is warranted in order to

understand the various goals and the potential facilitators and barriers of HIV care engagement for intervention development [50]. Men with a concordant-positive primary partner may benefit from interventions that involve both partners in each other's HIV care that can in turn facilitate emotional and instrumental social support and strengthens relationship dynamics such as a sense of solidarity and intimacy [28, 42]. Given the social context of HIV disease management, relational factors should be considered in future research as part of the complexity and dynamism in how and why young Black men living with HIV engage in HIV care [21, 29].

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

Appendix 1

See Table 4

Table 4 Bivariate, multivariable analyses of having a regular healthcare provider and partnership status among young, Black men who have sex with men living with HIV in Dallas and Houston, Texas, 2009–2014

Variable	Category	N	Bivariate ^a		Multivariable ^b	
			% Yes	p	AOR	95 % CI
Relational						
Partnership status	Single	171	81.3	0.006	1.00	1.20–5.54
	In a relationship	178	91.6		2.58	
Individual						
City	Dallas	173	87.3	0.715	1.00	0.33–1.48
	Houston	178	86.0		0.70	

Table 4 continued

Variable	Category	N	Bivariate ^a		Multivariable ^b	
			% Yes	p	AOR	95 % CI
Survey				0.679		
	2009	51	84.3		1.00	
	2010	66	83.3		0.83	0.24–2.80
	2011	55	83.6		1.03	0.29–3.67
	2012	59	88.1		1.57	0.40–6.27
	2013	58	87.9		1.10	0.30–4.06
	2014	62	91.9		1.96	0.47–8.21
Age (years)				0.439		
	18–20	30	83.3		1.00	
	21–23	104	82.7		1.08	0.29–3.96
	24–26	106	89.6		1.81	0.44–7.36
	27–29	111	88.3		1.27	0.31–5.26
Time since HIV diagnosis				0.580		
	0–12 months	111	87.4		1.00	
	13–24 months	47	87.2		0.95	0.31–2.94
	25–60 months	104	85.6		0.59	0.25–1.42
	>5 years	76	92.1		1.47	0.48–4.50
Sociostructural						
Educational attainment				0.183		
	<Grade 12	70	80.0		1.00	
	Grade 12	102	87.3		1.64	0.55–4.89
	>Grade 12	175	89.1		1.30	0.47–3.61
Employment status				0.048		
	Full-time	176	90.9		1.00	
	Part-time	67	83.6		0.60	0.22–1.68
	Unemployed/disabled	106	81.1		0.63	0.24–1.66
Annual income				0.465		
	<\$10,000	117	84.6		1.00	
	\$10,000–\$19,999	49	87.8		0.82	0.25–2.75
	\$20,000–\$39,999	109	84.4		0.52	0.19–1.39
	\$40,000 or more	71	91.5		0.73	0.19–2.76
Incarceration				0.068		
	In the past year	69	78.3		1.00	
	>1 year ago	49	83.7		0.84	0.27–2.64
	Never	224	89.3		2.46	0.95–6.38
Homelessness				0.341		
	In the past year	49	85.7		1.00	
	>1 year ago	31	77.4		0.35	0.08–1.44
	Never	265	87.5		0.93	0.30–2.89
Sexual orientation				0.685		
	Gay-identified	284	87.0		1.00	
	Other-identified	67	85.1		1.39	0.51–3.78
Total		351	86.6			

OR odds ratio, CI confidence interval

^a P-value is for χ^2 statistic for omnibus test assessing relationship between variable and outcome in a simple logistic regression analysis

^b AOR with 95 % CI ($N = 325$, Hosmer–Lemeshow goodness of fit test p-value = 0.34)

Appendix 2

See Table 5

Table 5 Bivariate, multivariable analyses of currently receiving HIV healthcare and partnership status among young, Black men who have sex with men living with HIV In Dallas and Houston, Texas, 2009–2014

Variable	Category	N	Bivariate ^a		Multivariable ^b	
			% Yes	p	AOR	95 % CI
Relational						
Partnership status						
	Single	171	76.6	0.010	1.00	
	In a relationship	179	87.2		2.21	1.14–4.29
Individual						
City						
	Dallas	173	82.1	0.900	1.00	
	Houston	179	81.6		0.83	0.43–1.59
Survey						
	2009	52	76.9	0.428	1.00	
	2010	66	80.3		0.96	0.33–2.80
	2011	55	76.4		0.95	0.32–2.78
	2012	59	83.1		1.74	0.53–5.76
	2013	58	89.7		3.13	0.88–11.14
	2014	62	83.9		1.26	0.40–3.96
Age (Years)						
	18–20	30	80.0	0.448	1.00	
	21–23	104	79.8		0.95	0.28–3.17
	24–26	106	86.8		1.76	0.48–6.47
	27–29	112	79.5		0.72	0.20–2.68
Time since HIV diagnosis						
	0–12 months	111	76.6	0.208	1.00	
	13–24 months	47	85.1		2.05	0.75–5.62
	25–60 months	105	86.7		1.53	0.70–3.36
	>5 years	76	85.5		2.28	0.90–5.77
Sociostructural						
Educational attainment						
	<Grade 12	70	80.0	0.868	1.00	
	Grade 12	103	81.6		1.28	0.47–3.48
	>Grade 12	175	82.9		0.96	0.37–2.46
Employment status						
	Full-time	177	84.2	0.482	1.00	
	Part-time	67	79.1		0.56	0.22–1.43
	Unemployed/disabled	106	79.2		0.84	0.35–2.04
Annual income						
	<\$10,000	118	81.4	1.000	1.00	
	\$10,000–\$19,999	49	81.6		0.71	0.25–2.05
	\$20,000–\$39,999	109	81.7		0.74	0.30–1.86
	\$40,000 or more	71	81.7		0.56	0.18–1.76

Table 5 continued

Variable	Category	N	Bivariate ^a		Multivariable ^b	
			% Yes	p	AOR	95 % CI
Incarceration ^c				0.017		
	In the past year	70	78.6		1.00	
	>1 year ago	49	67.3		0.40	0.14–1.10
Homelessness	Never	224	85.3	0.536	1.84	0.76–4.44
	In the past year	50	84.0		1.00	
	>1 year ago	31	74.2		0.32	0.08–1.23
Sexual orientation	Never	265	81.9	0.674	0.64	0.23–1.80
	Gay-identified	285	81.4		1.00	
	Other-identified	67	83.6		1.61	0.65–3.98
Total		352	81.8			

$p \leq .05$ are indicated in boldface type

OR odds ratio, CI confidence interval

^a P-value is for χ^2 statistic for omnibus test assessing relationship between variable and outcome in a simple logistic regression analysis

^b AOR with 95 % CI ($N = 326$, Hosmer–Lemeshow goodness of fit test p-value = 0.89)

^c Never versus >1 year ago: OR = 4.63 (95% CI 1.99–10.81)

Appendix 3

See Table 6

Table 6 Bivariate, multivariable analyses of ever receiving antiretroviral therapy and partnership status among young, Black men who have sex with men living with HIV in Dallas and Houston, Texas, 2009–2014

Variable	Category	N	Bivariate ^a		Multivariable ^b	
			% Yes	p	AOR	95 % CI
Relational Partnership status				0.010		
	No partner	171	60.8		1.00	
	Have a partner	179	73.7		1.70	1.01–2.88
Individual City				0.112		
	Dallas	173	63.6		1.00	
	Houston	179	71.5		1.33	0.79–2.26
Survey				0.081		
	2009	52	57.7		1.00	
	2010	66	62.1		1.22	0.51–2.94
	2011	55	61.8		1.29	0.53–3.14
	2012	59	71.2		2.34	0.90–6.09
	2013	58	70.7		1.72	0.66–4.46
2014	62	80.6		3.20	1.18–8.67	

Table 6 continued

Variable	Category	N	Bivariate ^a		Multivariable ^b	
			% Yes	p	AOR	95 % CI
Age (years)				0.129		
	18–20	30	66.7		1.00	
	21–23	104	58.7		0.73	0.27–1.99
	24–26	106	71.7		1.26	0.44–3.59
	27–29	112	72.3		1.18	0.40–3.47
Time since HIV diagnosis ^c				0.003		
	0–12 months	111	55.9		1.00	
	13–24 months	47	70.2		1.81	0.81–4.05
	25–60 months	105	75.2		2.11	1.11–4.02
	>5 years	76	78.9		2.56	1.20–5.44
Sociostructural						
Educational attainment				0.496		
	<Grade 12	70	67.1		1.00	
	Grade 12	103	64.1		1.13	0.51–2.54
	>Grade 12	175	70.9		0.89	0.41–1.94
Employment status				0.351		
	Full-time	177	70.6		1.00	
	Part-time	67	67.2		1.38	0.63–2.99
	Unemployed/disabled	106	62.3		1.09	0.54–2.23
Annual income				0.153		
	<\$10,000	118	61.9		1.00	
	\$10,000–\$19,999	49	65.3		1.30	0.56–3.02
	\$20,000–\$39,999	109	68.8		1.20	0.57–2.52
	\$40,000 or more	71	77.5		1.56	0.61–3.99
Incarceration				0.080		
	In the past year	70	67.1		1.00	
	>1 year ago	49	53.1		0.43	0.17–1.06
	Never	224	70.1		0.98	0.48–2.02
Homelessness				0.939		
	In the past year	50	68.0		1.00	
	>1 year ago	31	64.5		0.68	0.23–2.08
	Never	265	67.5		0.93	0.41–2.07
Sexual orientation				0.930		
	Gay-identified	285	67.7		1.00	
	Other-identified	67	67.2		0.92	0.47–1.79
Total		352	67.6			

$p \leq .05$ are indicated in boldface type

OR odds ratio, CI confidence interval

^a P-value is for χ^2 statistic for omnibus test assessing relationship between variable and outcome in a simple logistic regression analysis

^b AOR with 95 % CI ($N = 326$, Hosmer-Lemeshow goodness of fit test p -value = 0.74)

^c Multivariable OR and CI: 25–60 months versus 13–24 months 1.17 (0.51–2.73) >5 years versus 13–24 months 1.39 (0.54–3.57) >5 years versus 25–60 months 1.18 (0.53–2.64)

Appendix 4

See Table 7

Table 7 Bivariate, multivariable analyses of currently receiving antiretroviral therapy and partnership status among young, Black men who have sex with men living with HIV in Dallas and Houston, Texas, 2009–2014

Variable	Category	N	Bivariate ^a		Multivariable ^b	
			% Yes	p	AOR	95 % CI
Relational						
Partnership status	No partner	104	86.5	<0.001	1.00	
	Have a partner	132	59.1		0.36	0.17–0.79
Individual						
City	Dallas	110	74.5	0.247	1.00	
	Houston	127	67.7		1.25	0.59–2.64
Survey	2009	30	66.7	0.229	1.00	
	2010	41	65.9		1.49	0.36–6.19
	2011	33	63.6		1.05	0.28–3.87
	2012	42	66.7		1.56	0.39–6.26
	2013	41	85.4		3.22	0.69–14.95
	2014	50	74.0		1.65	0.40–6.74
Age (years)	18–20	20	55.0	0.289	1.00	
	21–23	61	75.4		1.54	0.32–7.41
	24–26	75	74.7		1.11	0.22–5.50
	27–29	81	67.9		1.02	0.21–5.02
Time since HIV diagnosis	0–12 months	62	64.5	0.411	1.00	
	13–24 months	33	72.7		1.23	0.40–3.82
	25–60 months	79	77.2		1.84	0.69–4.92
	>5 years	59	69.5		1.93	0.66–5.62
Sociostructural						
Educational attainment	<Grade 12	47	48.9	0.001	1.00	
	Grade 12	65	73.8		3.17	1.07–9.44
	>Grade 12	124	78.2		1.98	0.73–5.34
Employment status	Full-time	124	76.6	0.020	1.00	
	Part-time	45	75.6		1.14	0.36–3.58
	Unemployed/disabled	66	57.6		0.35	0.13–0.93
Annual income	<\$10,000	73	63.0	0.008	1.00	
	\$10,000–\$19,999	32	84.4		1.53	0.38–6.10
	\$20,000–\$39,999	75	81.3		0.79	0.25–2.50
	\$40,000 or more	54	61.1		0.29	0.09–1.00

Table 7 continued

Variable	Category	N	Bivariate ^a		Multivariable ^b	
			% Yes	p	AOR	95 % CI
Incarceration				0.001		
	In the past year	47	48.9		1.00	
	>1 year ago	26	69.2		1.77	0.50–6.30
	Never	156	78.8		1.97	0.79–4.86
Homelessness				<0.001		
	In the past year	34	38.2		1.00	
	>1 year ago	20	75.0		3.88	0.77–19.53
	Never	178	77.5		3.86	1.23–12.13
Sexual orientation				0.163		
	Gay-identified	192	72.9		1.00	
	Other-identified	45	62.2		0.65	0.26–1.65
Total		237	67.3			

$p \leq .05$ are indicated in boldface type

OR odds ratio, CI confidence interval

^a P-value is for χ^2 statistic for omnibus test assessing association between variable and outcome in a simple logistic regression analysis

^b AOR with 95 % CI ($n = 224$, Hosmer–Lemeshow goodness of fit test p-value = 0.52)

Appendix 5

See Table 8

Table 8 Bivariate, multivariable analyses of No Missed Doses in past 30 days and partnership status among young, Black men who have sex with men living with HIV in Dallas and Houston, Texas, 2009–2014

Variable	Category	N	Bivariate ^a		Multivariable ^b	
			% Yes	p	AOR	95 % CI
Relational Partnership status				0.064		
	No/concordant partner	135	48.9		1.00	
	Discordant	33	66.7		2.45	0.94–6.38
Individual City				0.527		
	Dallas	82	54.9		1.00	
	Houston	86	50.0		0.79	0.37–1.68
Survey				0.330		
	2009	20	55.0		1.00	
	2010	27	63.0		0.91	0.20–4.06
	2011	21	33.3		0.41	0.09–1.78
	2012	28	53.6		0.69	0.17–2.85
	2013	35	45.7		0.60	0.14–2.51
	2014	37	59.5		1.01	0.26–3.92
Age (years)				0.448		
	18–20	11	36.4		1.00	
	21–23	46	58.7		5.23	0.84–32.59
	24–26	56	55.4		4.37	0.70–27.10
	27–29	55	47.3		3.21	0.49–20.95

Table 8 continued

Variable	Category	N	Bivariate ^a		Multivariable ^b	
			% Yes	<i>p</i>	AOR	95 % CI
Time since HIV diagnosis				0.580		
	0–12 months	40	62.5		1.00	
	13–24 months	24	50.0		0.52	0.16–1.69
	25–60 months	61	50.8		0.51	0.19–1.36
	>5 years	41	48.8		0.47	0.16–1.36
Sociostructural						
Educational attainment				0.748		
	<Grade 12	23	52.2		1.00	
	Grade 12	48	47.9		0.76	0.21–2.77
	>Grade 12	97	54.6		1.02	0.32–3.26
Employment status				0.350		
	Full-time	95	52.6		1.00	
	Part-time	34	61.8		1.67	0.59–4.69
	Unemployed/disabled	38	44.7		0.79	0.30–2.10
Annual income				0.945		
	<\$10,000	46	52.2		1.00	
	\$10,000–\$19,999	27	55.6		0.79	0.25–2.48
	\$20,000–\$39,999	61	54.1		0.89	0.30–2.62
	\$40,000 or more	33	48.5		0.90	0.25–3.23
Incarceration				0.288		
	In the past year	23	39.1		1.00	
	>1 year ago	18	61.1		2.14	0.50–9.14
	Never	123	55.3		1.66	0.56–4.86
Homelessness				0.809		
	In the past year	13	61.5		1.00	
	>1 year ago	15	53.3		0.86	0.14–5.13
	Never	138	52.2		0.79	0.19–3.29
Sexual orientation				0.782		
	Gay-identified	140	52.9		1.00	
	Other-identified	28	50.0		1.26	0.47–3.37
Total		168	52.4			

p ≤ .05 are indicated in boldface type

OR odds ratio, CI confidence interval

^a P-value is for χ^2 statistic for omnibus test assessing relationship between variable and outcome in a simple logistic regression analysis

^b AOR with 95% CI (*n* = 162, Hosmer–Lemeshow goodness of fit test *p*-value = 0.25)

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