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Prevalence of U=U awareness and its association with anticipated HIV stigma among low-income heterosexually active Black and Latino adults in New York City, 2019.

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Abstract

The fact that people with HIV (PWH) who have an undetectable viral load cannot sexually transmit HIV has been disseminated under the messaging “Undetectable = Untransmittable” (U=U). U=U messaging intends to destigmatize HIV by demonstrating that PWH can have healthy sexual lives. Among a sample of low-income heterosexually active Black and Latino adults, we aimed to 1) measure the prevalence of U=U awareness, and 2) determine its association with anticipated HIV stigma. Low-income heterosexually active adults were recruited via respondent-driven sampling in New York City. Among Black and Latino participants who self-reported not having HIV, multiple linear regression was used to determine the association between U=U awareness with the following types of anticipated HIV stigma, as determined by principal component analyses: 1) general; 2) dating-related; and 3) sex-related. Of 485 participants, 35% were aware of U=U. Those who were aware reported less dating-related (adjusted B: -0.20 ; 95% CI: $-0.37, -0.03$) and sex-related (adjusted B: -0.15 ; 95% CI: $-0.29, -0.002$) anticipated HIV stigma. Although the prevalence of U=U awareness was much lower than reported in other populations (e.g., gender and sexual minorities, PWH), prevalence was moderate in our sample, given that awareness efforts have generally not focused on heterosexually active adults. Our findings provide preliminary evidence that U=U awareness may have an impact on anticipated HIV stigma related to dating and sex. Additional methods to disseminate U=U messaging and to dismantle HIV stigma in this population should be explored.

Keywords

Undetectable = Untransmittable; HIV stigma; heterosexually active adults at increased risk

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Introduction

A body of research has concluded that people with HIV (PWH) who have an undetectable viral load cannot sexually transmit HIV.¹⁻³ This finding represents a paradigm shift in HIV prevention and treatment and, in 2016, was conceptualized and disseminated as “Undetectable = Untransmittable” (U=U) by the Prevention Access Campaign.⁴ This galvanized an era of mass campaigning by community-based organizations and public health agencies aimed at increasing its awareness. Data demonstrate early success of U=U messaging with high awareness reported in gender and sexual minority populations⁵⁻⁷ and PWH.^{8,9} U=U messaging may positively influence HIV-related outcomes, with recent data indicating that PWH who were aware of U=U were more likely to self-report an undetectable viral load.⁸ In addition to motivating PWH to obtain an undetectable viral load, U=U is also an affirming and destigmatizing message that PWH can have healthy sexual lives and cannot sexually transmit HIV if they are undetectable. A recent study revealed that among a sample of sexual minority men with HIV, 59% reported that U=U made them feel ‘much better’ about having HIV and 41% reported that U=U had the potential to make HIV stigma ‘much better.’⁷ Given its potential to combat HIV stigma, U=U messaging may promote a status-neutral approach to ending the HIV epidemic as HIV stigma is a structural barrier to HIV testing¹⁰⁻¹⁴ and pre-exposure prophylaxis (PrEP) uptake¹⁵⁻¹⁸ among people without HIV and to care and treatment among PWH.¹⁹⁻²³

Given the recency of U=U, however, empirical data examining the role of U=U in dismantling HIV stigma are scarce. In their HIV Stigma Framework, Earnshaw and Chaudoir proposed that HIV stigma affects both PWH and people without HIV through different mechanisms and can serve as an impediment to HIV prevention and treatment efforts.²⁴ One study among PWH in 25 countries suggests that U=U may influence PWH’s perceptions and anticipations of HIV stigma from others as findings indicated that those who were aware of U=U were more likely to feel comfortable disclosing their status.⁸ What is currently unknown is if U=U influences HIV stigma that affects people without HIV. For example, it is possible that since U=U portrays PWH in a positive manner and exposure to U=U messaging may decrease the stigma one would foresee experiencing or internalizing if they were to have HIV, also known as anticipated HIV stigma.²⁵ Within populations of people without HIV, even less research on U=U has been conducted among heterosexually active adults at increased risk of HIV, a group among whom anticipated HIV stigma has been identified as a potential barrier to HIV testing^{13,26} due to fear of finding out about having HIV. Other data suggest that among women, anticipated HIV stigma can act as an obstacle to PrEP uptake if potential users are concerned others will believe they are taking antiretrovirals for HIV treatment.^{15,16} Targeting HIV stigma through U=U messaging has the potential to reduce the stark racial/ethnic and socioeconomic HIV disparities that exist among heterosexually active adults (e.g. Black and Latina women) due to intersecting forms of structural oppression, and yet, it is currently unknown if U=U messaging is effectively reaching this population. Among a sample of low-income Black and Latino heterosexually active adults from New York City (NYC), we aimed to: 1) measure the prevalence of U=U awareness; and 2) determine the association between U=U awareness and anticipated HIV stigma.

Methods:

Study Design

This analysis used NYC data from the fifth round of the CDC's National HIV Behavioral Surveillance Study (NHBS) among heterosexually active adults at increased risk for HIV, also known as HET5. Participants were recruited via respondent-driven sampling (RDS). Initial recruits, also known as "seeds," were identified during formative research or through community outreach. Although the target analytical sample was heterosexually adults at increased risk, the eligibility criteria to participate in the study was broader than the criteria used to define participants who were heterosexually adults at increased risk. Participants were eligible for the study if they: 1) were 18–60 years old; 2) identified as female and had vaginal or anal sex with a man in the past 12 months or identified as male and had vaginal or anal sex with a woman in the past 12 months; 3) were a resident of the NYC metropolitan statistical area; and 4) spoke English or Spanish. Eligible participants completed an interviewer-administered survey and were offered optional rapid HIV testing and women aged 30 years or younger were offered optional testing for vaginal and pharyngeal gonorrhea and chlamydia. Participants who completed the survey were considered part of CDC's target analytical sample of heterosexually active adults at increased risk for HIV if they additionally: 1) reported an annual household income that did not exceed 150% of the Health and Human Services poverty guidelines, adjusted for NYC's cost of living; 2) did not report injecting non-prescription drugs in the past 12 months; and 3) if male, did not have a male sex partner in the past 12 months. To maximize recruitment of this target sample, only participants who met this sample criteria were eligible to recruit up to five peers for the study. For this analysis, the target sample was further restricted to Black and Latino adults who did not self-report having HIV (see Statistical analysis section). Participants received incentives for all study components (survey completion, HIV testing, STI testing, and peer recruitment). Data were collected from June - October 2019 at sites located in East Harlem and Central Brooklyn. The study was anonymous and approved by the Institutional Review Board of the NYC Department of Health and Mental Hygiene.

Measures

Anticipated HIV stigma was measured through an adapted brief version¹⁰ of Berger et al.'s HIV stigma scale.²⁷ This scale was further adapted for use in this study among people who are heterosexually active. Using a 4-point Likert scale, participants were asked the extent to which they agreed to the following seven statements: 1) If you had HIV no one would date or become involved with you; 2) If you had HIV, you would worry about people discriminating against you; 3) If you had HIV, people would not want to have sex with you; 4) If you had HIV, you would work hard to keep your HIV a secret; 5) Upon learning that you had HIV, you would feel set apart and isolated from the rest of the world; 6) You would feel you were not as good a person if you had HIV; and 7) You would never feel ashamed of getting HIV. Responses ranged from "Strongly Disagree" to "Strongly Agree." Principal component analysis (PCA) was conducted to determine the number of components underlying the items. The seventh item was reverse-coded and excluded from the PCA due to low correlation (<5%) with all other items. Items 2, 4, 5, and 6 loaded onto one component, which we labeled "general anticipated HIV stigma," and items 1 and 3 loaded

onto a second component, which we labeled “romance-related anticipated HIV stigma.” Combined, components 1 and 2 accounted for 61% of the total variance. General anticipated HIV stigma was measured by summing the items to obtain a total score, with higher scores indicating greater stigma (range: 4–16; Cronbach’s alpha = 0.71). Because at least three items per component are needed and the second component consisted of only two items, we examined each item, dating-related anticipated HIV stigma and sex-related anticipated HIV stigma, as separate outcomes. These two items were examined as continuous variables with higher scores indicating greater stigma (range: 1–4).

The exposure of interest was awareness of U=U. Participants were first asked, “A doctor may tell someone living with HIV that their HIV is “undetectable.” Have you heard this term before?” Participants who responded ‘yes’ were then asked, “A person with HIV whose virus is undetectable cannot pass HIV to their sex partners. Have you heard this before?” Participants who responded ‘yes’ were categorized as being aware of U=U, and those who responded ‘no’ to either question were categorized as not being aware of U=U.

Covariates selected as potential confounders of the association between awareness of U=U and anticipated HIV stigma were based on prior research and included socio-demographics (race/ethnicity, self-identified gender, age group, education level, nativity, homelessness, and poverty level), sexual behaviors in the past 12 months (any condomless vaginal or anal sex, condomless vaginal or anal sex with a casual partner), health care access and experiences (has health insurance, visited a health care provider in the past 12 months, and experienced discrimination in the health care setting in the past 12 months), and engagement in HIV prevention activities in the past 12 months (took an HIV test, discussed PrEP with a provider, and participated in an HIV behavioral intervention).

Statistical analysis

Of the participants in the target sample of low-income heterosexually active adults, analyses were restricted to Hispanic/Latino or Black, non-seed participants who did not self-report an HIV-positive status. Participants who identified as male and reported ever having sex with a man or who identified as gay or bisexual were excluded from this analysis. To determine differences in the outcomes of interest by U=U awareness and potential confounders, *t* tests and ANOVA were used to determine differences the three outcomes of interest. Multiple linear regression was used to determine the associations between the outcomes of interest and U=U awareness, adjusting for potential confounders.. For each model, the association between U=U awareness and the outcome of interest was adjusted for covariates associated with the outcome at $p < 0.1$. All analyses were conducted using SAS 9.4 (Cary, NC).

Results

We recruited a total of 515 participants (9 seeds and 506 non-seeds), of whom 485 met the inclusion and exclusion criteria for this analysis. Most participants in the analytical sample were Black (68%) and male (53%), with 41% aged 18–29 years (Table 1). In terms of socioeconomic status, most participants had a high school level education or greater (73%) and lived at or below the 2019 federal poverty level (80%). Frequency of engagement in HIV prevention services in the past 12 months was low, with less than half of the sample

(49%) receiving an HIV test in the past 12 months and a fifth reporting participating in an HIV behavioral intervention. Despite low engagement in these services, awareness of U=U was moderate at 35%. In regard to anticipated HIV stigma, the average general anticipated HIV stigma score was 10.3 (SD = 2.5; range = 4–16); the average dating-related anticipated HIV stigma score was 2.6 (SD = 0.90; range = 1–4); and the average sex-related anticipated HIV stigma score was 3.0 (SD = 0.80, range = 1–4).

Unadjusted differences in U=U awareness and potential confounders by the three separate outcomes of interest are shown in Table 1. U=U awareness did not differ by general anticipated HIV stigma scores. Differences in scores were, however, found by health care discrimination and gender. Participants who were aware of U=U were had significantly lower levels of anticipated dating-related HIV stigma. Significant differences in dating-related anticipated HIV stigma were also observed by race/ethnicity. Those who were aware of U=U also had lower levels of anticipated sex-related HIV stigma. Significant differences in sex-related anticipated HIV stigma were also found by gender, condomless vaginal or anal sex in the past 12 months, and experiencing health care discrimination in the past 12 months.

Associations between U=U awareness and the three separate outcomes of interest are shown in Table 2. A significant association between U=U awareness and general anticipated HIV stigma was not found. However, those who were aware of U=U had lower levels of anticipated dating-related HIV stigma (adjusted B = -0.20; 95% CI: -0.37, -0.03) and sex-related HIV stigma (adjusted B = -0.15; 95% CI: -0.29, -0.002) compared to those who were unaware, after adjustment for potential confounders.

Discussion

In this sample of low-income Black and Latino heterosexually active adults with low HIV prevention uptake and facing multiple vulnerabilities, we found a moderate level of U=U awareness (35%) three years after the introduction of the U=U message. Notably, the relationship between U=U awareness and anticipated HIV stigma differed by type of stigma, with no association between U=U awareness and generalized HIV stigma but an inverse association between U=U awareness and dating-related and sex-related anticipated HIV stigma. These findings provide early evidence of the potential impact of U=U among heterosexually active adults at increased risk and highlight the need for varied approaches to dismantling different forms of HIV stigma.

To date, this is the only study we know of to examine U=U awareness among heterosexually active adults at increased risk of HIV in the US. The prevalence of U=U awareness in our study is lower when compared to assessments of awareness among gender and sexual minorities with and without HIV (70% - 86%)⁵⁻⁷ and other samples of PWH (85% - 88%)^{8,9}, a pattern also seen in Italy.²⁸ We expected awareness to be lower in this population because U=U awareness efforts in the U.S. have largely focused on reaching gender and sexual minorities and PWH and engagement in HIV prevention services in this population is relatively low.²⁹⁻³¹ In NYC, past awareness of novel advancements in HIV prevention, such as PrEP, in groups that were did not include men who have sex with men (MSM), ranged from only 21% - 29% in 2016, four years after FDA approval.³²⁻³⁴ The higher

prevalence of U=U awareness observed in this sample could be partially due to the launch of a NYC marketing campaign to spread awareness of U=U in June 2019,³⁵ just at the beginning of our data collection period. This sex-positive campaign included people of different gender identities and racial/ethnic backgrounds and romantic couples of different sexual orientations, including heterosexual couples, and was widely advertised on NYC buses and the subway system.

Our findings highlight the importance of distinguishing types of HIV stigma when examining U=U. U=U awareness was associated with reduced reporting of dating-related or sex-related anticipated HIV stigma but was not associated with general anticipated HIV stigma. This could be attributed to the fact that U=U messaging speaks directly to the sexual transmission of HIV and explicitly conveys that PWH can have healthy sexual relationships but does not address other forms of HIV stigma that PWH face. Few studies have examined the association between U=U and HIV stigma, with HIV stigma defined differently across studies, which makes comparison of findings limited.

These results have public health implications for both raising awareness of U=U and dismantling HIV stigma. The relatively low prevalence of U=U awareness and earlier low estimates of PrEP awareness among heterosexually active adults at increased risk for HIV compared to other groups at increased risk for HIV, underscore the improvement needed in disseminating information related to HIV prevention to these populations who are disproportionately impacted by HIV. Mass campaigns focusing on this population should be included in primary care settings, non-health care settings in low-income neighborhoods, or through social media. In addition to campaigns, other methods of dissemination should be considered. HIV testing provides an opportunity to provide education on U=U during the counseling session as only 40% of study participants who received an HIV test in the past 12 months were aware of U=U (data not shown). Efforts should also prioritize addressing individual hesitations in U=U as data have shown that even if some people are aware of U=U, they may not necessarily perceive it to be accurate, or have trust and confidence in the message.^{5,6,36-38} There is also a need for more research on barriers to being aware of and endorsing U=U messaging among specific subpopulations at increased risk for HIV. For example, Meunier and colleagues categorized five stages of treatment as prevention adoption among MSM who exchange sex and recommended that efforts to promote treatment as prevention be tailored to each stage of adoption.³⁹ Our null finding that U=U awareness was not associated with general anticipated HIV stigma also has public health implications. Tailoring the content of U=U messaging to include the message that people with HIV can live normal lives, in addition to living healthy sex lives, may address HIV stigma more generally. These results also call for exploring additional approaches to addressing HIV stigma in this population. Among research and evaluation samples that mostly included Black and Latino adults, strategies that have reduced HIV stigma include faith-based interventions^{40,41}, a video intervention in community pharmacies aimed at normalizing HIV⁴², and a community health worker-led intervention.⁴³ Integrating U=U messaging within these types of interventions may be an effective strategy to dismantle multiple types of HIV stigma in a single intervention or setting.

This analysis is subject to some limitations. First, due to the cross-sectional nature of the study, temporality cannot be inferred. An intervention with a comparison group or a controlled trial would be best poised to assess the effectiveness of U=U messaging in reducing HIV stigma. Despite this, our data provide evidence of a potential impact. Second, our results are only generalizable to low-income Black and Latino heterosexually active adults in NYC, where mass U=U awareness campaigns from both the city and state health departments existed in 2019.

We found a moderate prevalence of U=U awareness among low-income Black and Latino heterosexually active adults in NYC. Although U=U awareness was not associated with general anticipated HIV stigma, it was inversely associated with anticipated HIV stigma related to dating and sex. This finding is promising in that it provides preliminary evidence of U=U's potential impact on anticipated HIV stigma. Our findings also suggest the need to increase U=U awareness efforts among heterosexually active adults at increased risk for HIV and the need for multipronged, intentional approaches to dismantling HIV stigma.

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Table 1.

Anticipated HIV stigma by selected characteristics among low-income Black and Latino heterosexually active adults (n=485); National HIV Behavioral Surveillance Study, New York City, 2019.

	Total n (%)	General anticipated HIV stigma (n=475)			Dating-related anticipated HIV stigma (n=480)			Sex-related anticipated HIV stigma (n=480)		
		Mean score (SD)	Test statistic	p-value	Mean score (SD)	Test statistic	p-value	Mean score (SD)	Test statistic	p-value
Race/ethnicity			-0.24	0.81		2.15	0.03		0.64	0.52
Hispanic/Latino	153 (32%)	10.3 (2.4)			2.7 (0.9)			3.1 (0.8)		
Non-Hispanic Black	332 (68%)	10.3 (2.6)			2.5 (0.9)			3.0 (0.8)		
Self-identified gender			-2.19	0.03		0.68	0.50		2.04	0.04
Male	259 (53%)	10.1 (2.6)			2.6 (0.9)			3.1 (0.8)		
Female	226 (47%)	10.6 (2.5)			2.5 (0.9)			2.9 (0.8)		
Age group			0.85	0.47		1.25	0.29		1.81	0.14
18–29	200 (41%)	10.3 (2.7)			2.6 (0.9)			3.1 (0.8)		
30–39	97 (20%)	10.3 (2.6)			2.6 (0.9)			3.0 (0.8)		
40–49	76 (16%)	9.9 (2.2)			2.4 (0.9)			2.9 (0.8)		
50	112 (23%)	10.5 (2.3)			2.5 (0.9)			3.0 (0.8)		
Education level			1.49	0.14		1.71	0.09		1.14	0.26
Less than high school	131 (27%)	10.6 (2.8)			2.7 (0.8)			3.1 (0.8)		
High school or greater	354 (73%)	10.2 (2.4)			2.5 (0.9)			3.0 (0.8)		
Foreign-born			-0.31	0.76		0.38	0.70		-0.45	0.65
Yes	58 (12%)	10.4 (2.4)			2.5 (0.9)			3.1 (0.7)		
No	427 (88%)	10.3 (2.6)			2.6 (0.9)			3.0 (0.8)		
Currently homeless			-1.34	0.18		-0.12	0.90		-0.6	0.55
Yes	61 (13%)	10.7 (3.0)			2.6 (1.0)			3.1 (0.9)		
No	424 (87%)	10.2 (2.5)			2.6 (0.9)			3.0 (0.8)		
Lives at or below the federal poverty level			-0.17	0.87		0.66	0.51		0.96	0.34
Yes	389 (80%)	10.3 (2.5)			2.6 (0.9)			3.0 (0.8)		
No	96 (20%)	10.3 (2.5)			2.6 (0.9)			3.1 (0.7)		

	Total n (%)	General anticipated HIV stigma (n=475)			Dating-related anticipated HIV stigma (n=480)			Sex-related anticipated HIV stigma (n=480)		
		Mean score (SD)	Test statistic	p-value	Mean score (SD)	Test statistic	p-value	Mean score (SD)	Test statistic	p-value
Had condomless vaginal or anal sex										
Yes	423 (87%)	10.4 (2.6)	-1.11	0.27						
No	62 (13%)	10.0 (2.3)			2.6 (0.9)	-0.49	0.63	3.1 (0.8)	-2.17	0.03
Had condomless vaginal or anal sex with casual partner										
Yes	174 (36%)	10.5 (2.5)	-1.49	0.14						
No	311 (64%)	10.2 (2.6)			2.6 (0.9)	-0.82	0.41	3.0 (0.8)	-0.81	0.42
Has health insurance										
Yes	421 (87%)	10.3 (2.6)	0.30	0.76						
No	63 (13%)	10.4 (2.5)			2.6 (0.9)	0.70	0.48	3.0 (0.8)	0.41	0.68
Visited a health care provider										
Yes	423 (87%)	10.3 (2.5)	1.12	0.26						
No	62 (13%)	10.7 (2.6)			2.7 (0.9)	0.52	0.61	3.1 (0.8)	-0.96	0.34
Experienced discrimination in health care setting										
Yes	29 (6%)	11.3 (2.8)	-2.13	0.03						
No	455 (94%)	10.2 (2.5)			2.6 (0.9)	-1.33	0.18	3.0 (0.8)	-2.50	0.01
Took an HIV test										
Yes	239 (49%)	10.3 (2.6)	0.07	0.94						
No	246 (51%)	10.3 (2.5)			2.6 (0.9)	-0.02	0.98	3.0 (0.8)	-0.01	0.99
Discussed PrEP with a provider										
Yes	18 (4%)	10.2 (2.2)	0.21	0.84						
No	466 (96%)	10.3 (2.6)			2.6 (0.9)	0.50	0.62	3.0 (0.9)	0.14	0.89
Participated in an HIV behavioral intervention										
Yes	98 (20%)	10.4 (2.3)	-0.47	0.64						
No					2.6 (0.9)			3.1 (0.8)		

	Total n (%)	General anticipated HIV stigma (n=475)			Dating-related anticipated HIV stigma (n=480)			Sex-related anticipated HIV stigma (n=480)		
		Mean score (SD)	Test statistic	p-value	Mean score (SD)	Test statistic	p-value	Mean score (SD)	Test statistic	p-value
	387 (80%)	10.3 (2.6)			2.6 (0.9)			3.0 (0.8)		
Aware of U=U										
Yes	170 (35%)	10.1 (2.5)	1.6	0.11	2.4 (0.8)	2.67	0.008	2.9 (0.8)	1.97	0.049
No	314 (65%)	10.4 (2.5)			2.7 (0.9)			3.1 (0.8)		

¹In the past 12 months

Adjusted associations between awareness of U=U and anticipated HIV stigma among low-income Black and Latino heterosexually active adults (n=485); National HIV Behavioral Surveillance Study, New York City, 2019.

Table 2.

	General anticipated HIV stigma ¹		Dating-related anticipated HIV stigma ²		Sex-related anticipated HIV stigma ³	
	Adjusted B (95% CI)	p-value	Adjusted B (95% CI)	p-value	Adjusted B (95% CI)	p-value
Aware of U=U						
Yes	-0.39 (-0.86, 0.08)	0.11	-0.20 (-0.37, -0.03)	0.02	-0.15 (-0.29, -0.002)	0.047
No	<i>ref.</i>	<i>ref.</i>	<i>ref.</i>	<i>ref.</i>	<i>ref.</i>	

¹ Adjusted for gender and experiencing health care discrimination.

² Adjusted for race/ethnicity and education level.

³ Adjusted for gender, condomless vaginal or anal sex, and experiencing health care discrimination.