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The importance of sexual history taking for PrEP comprehension among young people of color

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Abstract

Despite demonstrated efficacy, uptake of pre-exposure prophylaxis (PrEP) remains low, especially among highest priority populations. This study examined four PrEP messaging factors hypothesized to impact comprehension of PrEP educational information: 1) modality (video versus in-person message delivery); 2) frame (risk versus health focus); 3) specificity (gist versus verbatim efficacy information); and 4) sexual history (administered either before or after PrEP education). We examined message comprehension among 157 young people of color (YPoC) eligible for PrEP, using a series of multiple choice questions. Overall, 65.6% ($n = 103$) got all message comprehension questions correct. In multivariate analyses, engaging in a sexual history *before* receiving PrEP education was associated with increased odds of message comprehension ($aOR = 2.23$; 95% CI: 1.06–4.72). This effect was even stronger among those who received PrEP education via video ($aOR = 3.53$; 95% CI: 1.16–10.81) compared to via health educator. This research underscores the importance of sexual history-taking as part of PrEP education and clinical practice for YPoC, and suggests that engaging patients in a sexual history *prior* to providing them with PrEP education may be key to increasing comprehension.

INTRODUCTION

In the United States (U.S.), the HIV epidemic is characterized by disparities. Men who have sex with men (MSM) represent 63% of new infections annually, and account for 82% of all infections among adult and adolescent males;¹ 30% of new infections are among young MSM (i.e., under the age of 24),² and of these, 78% are young men of color who have sex

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Compliance with Ethical Standards

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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.

with men.¹ HIV rates among transgender women (TW) surpass even those reported among MSM,^{3,4} reaching prevalence in some studies of over 50%.^{3,5} From 2010 to 2014, HIV incidence increased *only* among young adults (ages 25–29) and this group had the highest rate of infection (35.8 per 100,000), followed by those ages 20–24 (34.3 per 100,000),⁶ with a recent modeling study further predicting that 40% of Black/African American MSM will be HIV-seropositive by age 30, and 62% by age 40.⁷

Annual HIV incidence in the U.S. has remained constant since the 1990s, despite significant investment in prevention interventions.⁸ Biomedical interventions to reduce maternal-child transmission and structural/needle and syringe exchange interventions to reduce transmission through intravenous drug use have proven extremely effective,^{9–11} but interventions to reduce sexual transmission have not demonstrated similar success. In 2014, 94% of diagnosed infections in the U.S. were attributable to sexual contact.⁶ Effective and acceptable interventions to reduce sexual transmission of HIV, especially among young people of color (YPoC), are urgently needed.

At present, one of the most promising HIV prevention strategies is pre-exposure prophylaxis (PrEP), which refers to the use of antiretroviral medication by uninfected persons. Daily oral antiretroviral medication for PrEP was FDA approved in 2012; however, uptake remains low,^{12,13} particularly among MSM of color.¹⁴ To date, research on PrEP adoption intentions and outreach efforts have largely focused on adult MSM.^{14–19} Although this work has identified important factors associated with willingness to take PrEP, little research has examined the best ways to effectively disseminate PrEP information to highest priority populations, such as YPoC.²⁰ Effective messaging requires that audience members fully comprehend its argument in order to make informed decisions and consequently take action.^{21,22} As such, full-scale implementation of PrEP requires the tailored development and dissemination of PrEP information to YPoC in a way that facilitates an understanding of PrEP efficacy, proper use, and potential side effects.

Computer- and internet-based interventions have garnered a significant amount of attention in recent years, given their potential for overcoming barriers to cost-effective dissemination and implementation.^{23–25} Multiple PrEP information videos have been developed and are being disseminated on-line, but little work has been undertaken to assess their impact.²⁶ Effective computerized messaging is a strategy with many promising features, including minimal cost for implementation, standardization of message content, individual customization of information through the use of computer algorithms, and the potential for dissemination in diverse settings such as community-based agencies, clinical settings, and the Internet.²⁷ On the other hand, there are concerns that computerized communication lacks interactive feedback, including the use of non-verbal cues that may allow counselors or educators to verify the level of comprehension, the potential to tailor messages to the needs of specific clients, or the ability to answer specific questions that arise for individuals in real-time.²⁸ In order to most effectively reach and engage YPoC in PrEP messages, we need to understand the potential benefits of video-based communication, as well as its potential limitations. However, few studies have directly compared video-based versus in-person messages to assess their differential impact on PrEP message comprehension.

There are several other messaging factors that may impact PrEP message comprehension. First, research on “framing” effects suggests that individuals react differently when prevention choices are framed in terms of potential *benefits* (i.e., “gain” or health frame: “taking PrEP will *help protect you* against HIV”) compared to potential *harms* (i.e., “loss” or risk frame: “if you don’t take PrEP, you *increase your risk* of becoming infected with HIV).^{29–31} Second, research on information processing, memory, and reasoning suggests that individuals process health messages based on the level of content specificity, by using either “*verbatim*” risk information (e.g., PrEP reduces the risk of HIV infection by over 90%) or “*gist*” risk information (e.g., PrEP is effective; PrEP is good).³² A reliance on gist information has been associated with inaccurate risk perception³³, because it minimizes the important nuances, probabilities, and outcomes associated with the risk-related information. However, verbatim information may prove confusing or distracting to patients when they receive health messages, especially those about prevention options.³⁴

In addition to messaging factors, there is evidence that the provision of a brief sexual history assessment – as is recommended as part of the CDC PrEP guidelines – may be an intervention in itself in producing behavior change.³⁵ Specifically, evidence suggests that one assessment method, the Timeline Follow-back (TLFB) Interview,³⁶ may be particularly effective at raising awareness of the consequences of engaging in risk behaviors, and has been shown to increase both sexual risk reduction motivations and greater risk sensitization, compared to standard assessments.^{37,38} Furthermore, personal relevance of information may be critical to message “involvement,” which has significant impacts on cognitive processes that govern message comprehension, including attention and elaboration.³⁹ Finally, despite evidence which highlights the importance of sexual history taking in clinical settings,⁴⁰ research has yet to examine whether engaging in discussion about one’s own risk behavior prior to learning about PrEP impacts comprehension.

In order to examine messaging factors that might optimally impact comprehension among potential PrEP candidates, our research team conducted a large-scale research project that enrolled 500 MSM and transgender women who would be eligible for PrEP prescription based on recent risk behavior (i.e., condomless anal sex in the past 30 days). The present sub-analysis is restricted to the YPoC in the sample ($n = 157$), defined as those between the ages of 18 and 29 and who reported a race/ethnicity other than white. We assessed overall message comprehension in this sample, and then examined specific messaging factors (and their interactions) that might influence comprehension, controlling for significant psychological and behavioral covariates.

METHODS

Participants and Procedures

Between February 2012 and April 2014, participants were recruited using passive recruitment methods (i.e., flyers), active recruitment methods (i.e., outreach at bars, events, community-based organizations), and participant referral. Eligible participants: (1) were 18 years of age or older; (2) were born male, regardless of current gender identity; (3) self-reported a negative HIV- status; and (4) reported at least one condomless sex act with a male partner in the 30 days prior to the study visit. It is important to note that eligibility in this

sample did not limit condomless sex to *casual* partners, as mounting evidence suggests that risk for HIV infection among MSM can be linked to both casual and main partners.^{41–43} As noted above, the present analysis restricted the sample to YPoC as a highest priority population for PrEP. Participants completed a one-time, in-person visit where they received a PrEP educational message, engaged in a sexual history regarding their behavior in the past 30 days, and completed self-report measures on computer. PrEP educational messages included five components: a) *What is PrEP?* (including the fact that PrEP is a new HIV prevention strategy and a description of the meaning of the words “pre-exposure prophylaxis”); b) *How does PrEP work?* (including an explanation of the way that anti-HIV medications fight infection and an explanation of why daily adherence is so important to keep concentrations of the medication high); c) *How do we know that PrEP works?* (including an explanation of iPrEx results); d) *Are there any side effects?* (including a description of potential side effects and their low prevalence); and e) *What about condoms?* (including a discussion of the role of condom use in preventing STDs and the importance of the entire toolbox of prevention strategies).

Participants were randomly assigned to one of eight PrEP messaging conditions, based on a 2x2x2 factorial design. Each message was varied by delivery modality (video versus health educator), message frame (risk versus health), and level of specificity (verbatim versus gist). For example, in one message condition, participants received a risk-framed, verbatim message delivered by a health educator; in another condition, participants received a health-framed, gist message delivered via video. All health educators used the same educational script that was used in the video conditions to deliver the PrEP message to the participant. The informational content presented in all messages was the same, however, the language used to present this information differed by condition. As described above, risk-framed messages presented PrEP information in terms of HIV risk and risk-reduction, e.g., “People who are particularly high-risk for HIV infection can take PrEP to reduce their risk of getting HIV.” Health-framed messages presented PrEP in terms of sexual health and health promotion, e.g., “Those who want to increase their control over their sexual health may choose PrEP as part of their strategy to stay HIV-negative.” Verbatim messages presented data from the iPrEx study using detailed numerical information and percentages; gist messages presented the same information without the use of specific numbers or percentages.

Participants in each of the eight conditions were also counterbalanced to complete a sexual history (i.e., interviewer administered TLFB regarding sexual behavior and substance use in the past 30 days) either before or after receiving the PrEP educational message. All participants then completed a self-administered computerized survey on comprehension of the message. All procedures were reviewed and approved by the Human Research Protections Program at the City University of New York.

Measures

Demographics—Participants self-reported their age, income, education, gender identity, race and ethnicity, and relationship status.

Message Comprehension—To assess message comprehension, participants were given five multiple-choice questions via self-administered survey that were based on the factual information about PrEP presented in the message. Specifically, we asked participants two questions about proper use: 1) “To be effective PrEP must be taken...,” (correct answer: “every day, whether or not I have sex.”); 2) “Why is it important for PrEP to be taken every day?” (correct answer: “Because you have to make sure there is PrEP medication in your bloodstream at all times, so that it can protect you whenever you are exposed to HIV”). We also asked participants two questions about side effects: 1) “The most common side effect of PrEP is...” (correct answer: nausea/stomach upset.); 2) Which of the following is true about PrEP side effects? (correct answers/check all that apply: If you experience side effects, you should discuss them with your health care provider; If you experience side effects, they will likely go away in the first four weeks). Finally, we asked participants about the meaning of partial effectiveness, because PrEP information and guidelines in 2012–2014 stressed the fact that PrEP was not 100% effective in preventing HIV. This question read: “The fact that PrEP is only partially effective in preventing HIV means that...” (correct answer: “Taking PrEP lowers the risk of HIV infection for everyone who takes it, but it doesn’t completely erase their risk.”) We created a dichotomous variable where message comprehension was defined as giving the correct answer to all five questions (Yes/No).

Sexual and Substance Use Behavior—As noted above, a modified version of the semi-structured TLFB was used for the assessment of sexual risk and substance use behavior.³⁶ Using a calendar, interviewers asked participants to report the type of sexual activity (anal or vaginal intercourse; with or without a condom) by partner type (primary or casual) on each of the preceding 30 days. Participants were also asked to report any substance use and heavy episodic alcohol use (i.e., five or more standard drinks on one occasion) on each of the preceding 30 days. Because of skewness in behavioral measures, we created five dichotomous variables indicating whether or not the participant had engaged in each of the following in past 30 days: 1) condomless anal sex with a casual partner; 2) condomless anal sex with an HIV-positive or status-unknown partner; 3) condom use during fewer than 50% of anal sex acts with casual partners; 4) any heavy episodic alcohol use; and 5) any stimulant use (including ecstasy, coke and/or methamphetamine).

Perceived HIV Risk was assessed using a single item in which participants were asked: “How likely do you think you are to get HIV in your lifetime?” Responses were given on a scale ranging from 0 (*Not at all likely*) to 100 (*I will definitely get HIV in my lifetime*).⁴⁴

An abbreviated 6-item **Health Numeracy Scale**⁴⁵ was used to assess participants’ ability to understand numerical expressions of risk, such as probabilities and percentiles. The Health Numeracy scale assesses general numeracy (i.e., “Imagine that we rolled a fair, six-sided die 1,000 times. Out of 1,000 rolls, how many times do you think the die would come up even?”), as well as comprehension of risk data (i.e., Which of the following numbers represent the biggest risk of getting a disease? 1 in 100; 1 in 1,000; or 1 in 10”). Each of the 6-items was coded as 1=correct versus 0=incorrect, and summed, such that higher scores indicated greater levels health numeracy.

The **Subjective Numeracy** scale⁴⁶ ($\alpha = 0.72$) was used to assess participants' perception of their own ability to perform mathematical tasks and their preferences for the use of numerical versus textual information. The scale consists of 7 items, such as "When people tell you the chance of something happening, do you prefer that they use words (it rarely happens) or numbers (there's a 1% chance)?" Higher subjective numeracy scores indicate a greater perceived numerical ability and greater preference for receiving numerical information.

The **Need for Cognition Scale**⁴⁷ ($\alpha = 0.80$) was used to assess the extent to which participants have a tendency to engage in and enjoy effortful cognitive activities. The scale consists of 18 items, such as "I only think as hard as I have to" and "The notion of thinking abstractly is appealing to me." Participants rated each item on a 5-point scale, with higher scores indicating stronger need for cognition. Need for cognition has been associated with information processing in decision-making⁴⁸ and individuals with low need for cognition have been found to be more susceptible to framing effects.⁴⁹

Statistical Analyses

All data were analyzed with SPSS version 22. We began by identifying demographic differences in PrEP message comprehension using Chi-square tests. Significant associations between psychological/behavioral covariates and comprehension were examined using *t*-tests. Chi-square tests were also used to examine significant associations between messaging factors (e.g., modality, sexual history order) and message comprehension. Factors which evidenced significant associations in bivariate analyses were included in multivariate models predicting message comprehension. Finally, because of our primary interest in the development of optimal messaging by modality (e.g., identifying message factors best suited to in-person or video delivery), we fit a separate multivariate regression model predicting comprehension by modality, including both message factors and psychosocial covariates that were significant in bivariate analyses.

RESULTS

The majority of the sample self-identified as male (95.5%; $n = 150$), with 4.5% ($n = 7$) identifying as female, transgender, or gender queer. Participant demographics are presented in Table 1, stratified by PrEP message comprehension. The sample ranged in age from 18 to 29 ($M = 24.45$, $SD = 3.11$), with half (52.2%) under the age of 25. In response to recent calls for greater specificity in analysis of racial and ethnic identity,⁵⁰ we first present the number of participants who reported a Hispanic ethnicity (41.4%) and then report participants' combination of racial and ethnic identities. Almost half of participants (48.7%) identified as non-Hispanic Black. The sample was relatively diverse in regards to educational attainment, but the majority reported relatively low annual income. Close to half the sample (44.6%; $n = 70$) reported that they were in a significant romantic relationship. Over 68% of participants reported condomless sex with a casual partner in the past 30 days, 31.2% reported condomless sex with a casual partner who was HIV-positive or of unknown HIV-status, and 24.8% of participants reported using condoms for anal sex with casual partners less than half

the time. Over 66% of the sample reported heavy episodic alcohol use, and 19.1% reported stimulant use in the past 30 days.

Bivariate Differences in PrEP Message Comprehension

Overall, 65.6% of participants ($n = 103$ out of 157) got all five of the message comprehension questions correct. Participants were most likely to answer the question about most common side effects correctly (94.9%), followed by the questions about proper PrEP use (94.3% correct), the reason for daily use (90.4% correct), correct actions to take if they experienced side effects (83.4% correct) and the meaning of partial effectiveness (81.5% correct). As shown in Table 1, PrEP message comprehension was positively associated with both education and income, but not with age, race/ethnicity, or relationship status. There was also a significant association between sexual history order and message comprehension, such that a higher percentage of participants who completed a sexual history before receiving the PrEP message got all comprehension questions correct (73.3%, $n = 55$ out of 103) compared to those who completed a sexual history after the message (58.5%, $n = 48$ out of 103).

Table 2 presents the association between psychological variables and PrEP message comprehension. Individuals who got all five comprehension questions correct scored significantly higher than those who did not on health numeracy, subjective numeracy, and need for cognition. There no differences by risk perception between those who got all five comprehension questions correct and those who did not.

Bivariate Differences in Comprehension by Message Factors and Modality

Given our interest in differences in messaging as related to modality (i.e., what message components are most important when the message is delivered via video versus health educator), we examined the effects of each factor (i.e., frame, specificity, and sexual history order) stratified by modality. Among participants who received the message via video, the positive impact on comprehension of engaging in a sexual history *prior* to receiving the message appeared to be intensified: 73% of participants who had engaged in a sexual history before the message got all comprehension questions correct, compared to only 50% of those who had not engaged in a sexual history before receiving the message, $\chi^2(1)=4.27$, $p<0.05$ (Figure 1a). In contrast, message comprehension among those who received the message from a health educator was significantly impacted by message frame: 80.5% of those who received a health-promotion message got all five questions correct, compared to only 59% of those who received the risk reduction message, $\chi^2(1)=4.41$, $p<0.05$ (Figure 1b).

Multivariate Predictors of Comprehension

Table 3 presents multivariate models predicting comprehension for the whole sample of YPoC, as well as by modality (video or educator). Variables included in the multivariate model were those that were significant in bivariate analyses. Due to concerns about multicollinearity because of high intercorrelations among health numeracy, subjective numeracy, and need for cognition, we decided to include only one of these variables. We chose subjective numeracy (participants' perception of their own ability to perform mathematical tasks and their preferences for the use of numerical versus written

information) because this variable can be most easily assessed in a clinical setting; it is not as threatening as asking the computational questions involved in health numeracy, and it avoids the potential for perceived microaggressions that might arise from using the need for cognition scale in clinical practice (e.g., asking a patient whether they tend to “only think as hard as they have to”). For the full sample, step one included education level (with BA or more as the referent group) and subjective numeracy. These two variables resulted in a statistically significant model, but the only parameter that was significant on its own was high school education, such that having only a high school education (compared to having a BA or more) was associated with 86% lower odds of getting all the questions correct. In the second step, we added sexual history order. The step was significant, indicating that – after adjusting for education and subjective numeracy, engaging in a sexual history *before* receiving the PrEP message was associated with 2.23 times the odds of getting all five comprehension questions correct compared to engaging in a sexual history *after* receiving the PrEP message.

Among those who received the video message, education was not significant in the first step. Subjective numeracy scores were significantly associated with comprehension, such that every one point increase in subjective numeracy was associated with over a two-fold increase in the odds of getting all five questions correct. Sexual history was also associated with comprehension for those who received the video message. After adjusting for education and subjective numeracy, individuals who engaged in a sexual history *before* receiving the PrEP message via video had over 3.5 times the odds of getting all five comprehension questions correct compared to those who engaged in a sexual history *after* receiving the PrEP message.

It is important to note that none of the results presented in this analysis of YPoC were replicated in the full sample or with other cohorts (i.e., young white people ($n = 76$); older men of color who have sex with men ($n = 151$); or older white MSM ($n = 107$)). As such, these analyses suggest findings that appear to be unique to the high priority cohort of YPoC.

DISCUSSION

We conducted an analysis of individual and messaging-related factors and procedures likely to influence comprehension among a sample of high-risk young people of color (YPoC), including both young MSM and young transgender women. Our findings point to: 1) the critical importance of sexual history taking as part of PrEP education and clinical practice, and 2) the potential impact of engaging patients in a sexual history *prior* to providing them with PrEP education as a key to increasing comprehension. In this sample, engaging in a sexual history prior to receiving education about PrEP was associated with between 2.2 (whole sample) and 3.5 (video messaging group) times the odds of fully comprehending the information. It is important to note that this effect on comprehension existed over and above traditional barriers to comprehension, including education level and subjective numeracy. Messages targeting individuals with less education often oversimplify or strip-down informational content in an effort to increase comprehension. These data suggest that increasing the personal relevance of the information can increase comprehension while maintaining the same level of complexity in content.

Although the mechanism through which engagement in providing a sexual history increased comprehension was not directly tested in this study, we hypothesize that it is related to the increased self-relevance of HIV prevention information. Research on the self-reference effect has demonstrated significant positive impact on memory when information is considered self-relevant,⁵¹ which is mediated by differences in brain processing.⁵² Neuroimaging data demonstrate that self-related processing during health communication is positively associated with later behavior change.⁵³ Given their highly vulnerable position vis-à-vis HIV transmission and the HIV treatment cascade,^{54–56} YPoC are bombarded with messages about the inevitability of HIV infection, causing them to become inured to or even dissociated from prevention messages. Furthermore, recent focus groups with young African-American MSM indicate that some barriers to adoption of HIV prevention can be partially explained by a feeling of powerlessness and apathy in the community, largely associated with racism and homophobia.⁵⁷ In a health care context, brief interactions that deem the patient unimportant and/or feeling a lack of self-relevance in the interaction have been shown to lead to disengagement from health care utilization, especially for individuals of color.^{58,59} Our data suggest that engaging in a sexual history may heighten the self-relevance of HIV prevention information, increasing memory and cognitive processing during PrEP education.

Increasing self-relevance may be even more important in the context of video-delivered messaging, as our data indicate even stronger impacts for participants who received the video message. This finding is particularly relevant to emerging PrEP education practices that move from face-to-face interactions to online platforms. In our study, the sexual history was done in person, by a trained health educator, even for participants in the video condition. For online PrEP messaging delivery, it might be useful to test computerized sexual history tools, some of which have already been created.^{60,61} Alternatively, hybrid PrEP counseling protocols may be adopted, where the initial contact is made in person by a trained counselor (during which sexual history is discussed), followed by a video viewing of PrEP information.

Finally, our data suggest that message comprehension was higher when YPoC received a “health-framed” message from the health educator, compared to the “risk-framed” message. Building on past evidence that gain-frames improve comprehension during in-person communication, this finding may be even more relevant for YPoC, who are multiply stigmatized and may have had negative experiences with the health care system. For YPoC, perceiving that a PrEP counselor is focused on their health – rather than simply their risk for HIV – may make them more receptive to education and intervention. More data are needed to understand these factors, and their impact on PrEP adoption among YPoC.

This research is subject to several limitations. Our study was conducted in New York City and our sample was comprised of a small sample of young men and transgender women who have sex with men and do not identify as white, and, as such, may not be generalizable to other samples. In fact, as noted above, our findings on the importance of sexual history for comprehension were not replicated with other cohorts in the larger study. We did not directly measure message self-relevance, and are therefore unable to test our hypotheses about the mechanism by which engagement in sexual history may impact comprehension or future

PrEP adoption., We did not assess knowledge about PrEP prior to participants' receiving the message; while, randomization should have accounted for any pre-existing differences in knowledge, we were unable to examine the impact of the PrEP messages on risk perception directly. Given the limited number of young transgender women and those who identified as gender queer in our sample, we were unable to examine differences by gender identity. Future research is needed to better understand the impact of PrEP messaging on comprehension among young transgender women and gender queer youth of color.

Despite these limitations, this study of YPoC – a high-priority population for PrEP education and engagement – has significant implications for the integration of PrEP programs into clinical practice. Consistent with CDC guidelines, our data suggest that sexual history conversations should be a vital part of any PrEP education and counseling sessions.⁶² Unfortunately, evidence indicates that engaging patients in sexual history is not normative. Taking sexual histories is not a routine practice among health care providers, and it is especially likely to be deferred during urgent care that may include HIV and STI testing or treatment.^{62–65} Lingering discomfort with and/or stigmatization of same-sex behaviors may lead to their failure to be routinely discussed by and with providers,⁶⁶ which represent missed opportunities for appropriate prevention and PrEP counseling. PrEP provides a unique opportunity to revitalize calls for sexual history taking in routine practice, and may underscore the importance of such engagement with patients. These data emphasize the urgent need to involve YPoC in HIV prevention conversations, which they perceive to be self-relevant and that are focused on their health, rather than their risk.

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Figure 1.

Table 1

Characteristics of study sample by PrEP message comprehension (N = 157)

	Total	All Comprehension Questions Correct (n = 103, 65.6%)	
	N (%)	N (%)	p-value
<i>Age</i>			--
18–24	82 (52.2)	55 (67.1)	
25–29	75 (47.8)	48 (64.0)	
<i>Hispanic Ethnicity</i>	65 (41.4)	44 (42.7)	--
<i>Race</i>			--
Non-Hispanic Black	78 (48.7)	47 (45.6)	
Other Non-Hispanic	10 (6.4)	8 (7.8)	
Hispanic Black	20 (12.7)	14 (13.6)	
Other Hispanic	26 (16.6)	21 (20.4)	
Multiracial	23 (14.6)	13 (12.6)	
<i>Education</i>			.000
High School or less	50 (31.8)	20 (40.0)	
Some/In College	64 (40.8)	46 (71.9)	
College or more	43 (27.4)	37 (86.0)	
<i>Income</i>			.000
Less than \$20,000	107 (68.2)	59 (55.1)	
\$20,000 or more	50 (31.8)	44 (88.0)	
<i>Relationship Status</i>			--
Single	87 (55.4)	61 (70.1)	
Partnered	70 (44.6)	42 (60.0)	
<i>Any CAS^a with CP^b</i>	107 (68.2)	70 (65.4)	--
<i>Any CAS with HIV+ or Status-Unknown CP</i>	49 (31.2)	27 (26.2)	--
<i>< 50% CU^c with CP</i>	39 (24.8)	28 (27.2)	--
<i>Heavy Alcohol Use</i>	104 (66.2)	70 (67.3)	--
<i>Stimulant Use</i>	30 (19.1)	20 (19.4)	--
<i>Frame</i>			--
Health Promotion	76 (48.4)	52 (68.4)	
Risk Reduction	81 (51.6)	51 (63.0)	
<i>Specificity</i>			--
Verbatim	79 (50.3)	55 (69.6)	
Gist	78 (49.7)	48 (61.5)	
<i>Modality</i>			--
In-person	80 (51.0)	56 (70.0)	
Video	77 (49.0)	47 (61.1)	
<i>Sexual History Order</i>			.05
Before Message	75 (47.8)	55 (73.3)	
After Message	82 (52.2)	48 (58.5)	

^aCAS = condomless anal sex

^bCP = casual partner

^c< 50% CU = Less than 50% condom use during anal sex

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Table 2

Differences in psychosocial variables by comprehension (N = 157)

	<u>All Comprehension Questions Correct</u>	
	No	Yes
	<u>M (SD)</u>	<u>M (SD)</u>
<i>Subjective Numeracy</i>	3.52(0.86)	4.01(0.90) **
<i>Health Numeracy</i>	2.89 (1.38)	3.63 (1.46) **
<i>Need for Cognition</i>	3.40 (0.49)	3.68 (0.52) **
<i>Risk Perception</i>	30.80 (24.82)	30.67 (23.32)

*
p < .05,**
p < .01.

Table 3

Predictors of PrEP message comprehension in the total sample and by message delivery modality

	Total Sample (<i>n</i> = 157)		Video Message (<i>n</i> = 77)		Health Educator (<i>n</i> = 80)	
	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2
	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)
Education (ref = BA or more)						
High School only	.14 ^{***} (.05–0.42)	.13 (.04–.38)	.39 (.10–1.46)	.26 (.06–1.09)	.09 ^{**} (.03–.34)	.09 ^{***} (.02–.33)
Some College	.46 (.16–1.30)	.41 (.14–1.16)	.83 (.23–2.93)	.77 (.21–2.85)	.57 (.32–1.02)	.56 (.31–1.01)
Subjective Numeracy	1.38 (.89–2.14)	1.38 (.88–2.17)	2.02 [*] (1.11–3.67)	1.95 [*] (1.03–3.70)	.84 (.42–1.72)	.83 (.41–1.69)
Sexual History First	--	2.23 [*] (1.06–4.72)	--	3.53 [*] (1.16–10.81)	--	.75 (.23–2.45)
	$\chi^2(3)=26.1$ ^{***}	$\chi^2(1)=4.6$ [*]	$\chi^2(3)=11.5$ ^{**}	$\chi^2(1)=5.4$ [*]	$\chi^2(3)=21.4$ ^{***}	$\chi^2(1)=.64$

*
p < .05,**
p < .01,***
p < .001