HHS Public Access

Author manuscript

J Acquir Immune Defic Syndr. Author manuscript; available in PMC 2017 October 01.

Published in final edited form as:

J Acquir Immune Defic Syndr. 2016 October 1; 73(2): e31–e33. doi:10.1097/QAI.0000000000001121.

Partner reports of HIV viral suppression predict sexual behavior in serodiscordant male couples

Amy A. Conroy, Ph.D., M.P.H.[1], **Kristi E. Gamarel, Ph.D., Ed.M.**[2], **Torsten B. Neilands, Ph.D.**[1], **John A. Sauceda, Ph.D., M.Sc.**[1], **Lynae A. Darbes, Ph.D.**[3], **Samantha E. Dilworth, M.S.**[1], **Jonelle M. Taylor, B.A.**[1], and **Mallory O. Johnson, Ph.D.**[1]

[1]Center for AIDS Prevention Studies, Department of Medicine, University of California - San Francisco, San Francisco, CA, United States

[2]Department of Psychiatry and Human Behavior, Brown University, Providence, RI, United States

[3]Department of Health Behavior and Biological Sciences, School of Nursing, University of Michigan, Ann Arbor, MI, United States

To the Editors

Biomedical prevention strategies, specifically the achievement of an undetectable viral load, can prevent transmission of HIV among men who have sex with men (MSM).[1] Moreover, among MSM, viral load information is used in the negotiation of condomless anal intercourse (CAI)[2,3] and studies find that MSM are more likely to engage in CAI if they believe their partners are virally suppressed.[4,5] To date, research on the association between viral load and CAI has focused exclusively on a single partner (i.e., the HIV-negative or HIV-positive partner) without attending to the dyadic nature of sexual relationships and potentially contributing to pseudo-unilaterality—a bias that results from continually studying only one side of a two-way interaction.[6]

The probability of HIV transmission is low when a partner is virally suppressed and clear of genital tract inflammation.[1] Yet viral-sorting practices (i.e., considering a partner's viral load when making decisions about sexual behaviors) rely on subjective beliefs about viral suppression, and recent data show that MSM are likely to overestimate that their primary partner is virally suppressed.[7] Thus, a better understanding of partner perceptions of viral suppression and sexual risk behavior has important implications for HIV prevention and clinical practice. In this study, we fill a key gap in the literature by examining the relative importance of both partners' self-reports of viral suppression—as well as confirmatory viral load blood test results—on intradyadic (i.e., within-couple) sexual risk behavior.

Corresponding Author: Amy A. Conroy, Ph.D. M.P.H., University of California, San Francisco, Center for AIDS Prevention Studies, 550 16th Street 3rd Floor, San Francisco, CA, United States, amy.conroy@ucsf.edu.

Conflicts of Interest:
There are no conflicts of interest to declare for any of the authors.

Methods

Data come from baseline assessments in the Duo Project, a longitudinal study of male couples from the San Francisco Bay Area.[7] From 2009 through 2013, a sample of 118 serodiscordant male couples (236 men) with an HIV-positive partner on ART completed a survey that assessed beliefs about viral suppression and sexual risk behavior. HIV-positive men on ART and their partners were interviewed simultaneously, but separately, using a combination of Computer Assisted Personal Interviewing (CAPI) and Audio Computer Assisted Self Interviewing (ACASI) methods. HIV-positive partners had blood drawn to assess viral load at the time of the interview. Blood samples were processed in a laboratory within 24–48 hours upon receipt of the specimen. The Committee on Human Research at the University of California, San Francisco approved this study. Informed consent was obtained from all participants.

For men on ART, self-reported viral suppression was assessed with the question “Was your last viral load test detectable or undetectable?” (“Yes,” “No,” or “Refuse”). No men refused to answer. Partner self-reports of viral suppression were assessed with the question “Was your partner’s last viral load detectable or undetectable?” (“Yes,” “No,” or “Refuse”). Only one partner refused to answer. HIV RNA viral load tests were performed using the COBAS® AmpliPrep/COBAS® TaqMan® HIV test kit (Roche Molecular Systems, Inc.), with an undetectability threshold of ≤ 48 copies/ml. Biologic viral suppression was dichotomized as detectable versus undetectable using this cutoff value. To capture intradyadic sexual risk behavior, we followed similar procedures described elsewhere.[8] In sum, we used both partners’ responses to compute a three-level categorical variable for sexual risk in the previous 3 months: (1) protected anal intercourse (PAI); (2) condomless anal intercourse (CAI); or (3) no anal intercourse. Couples were considered to have engaged in CAI if either partner reported anal sex in which condoms were not used consistently “every time.” Likewise, couples were considered to have engaged in PAI if both partners reported consistent condom use. Finally, couples were considered to have engaged in no anal intercourse if both partners reported no sexual activity. For couples with discrepant reports, decisions were made by erring on the side of greater risk. Couple-level agreement on sexual behavior was relatively high (84% of couples agreed about whether they had anal sex; 97% of couples who had anal sex agreed about whether sex was protected or not).

The data were organized at the couple level such that each row represented one couple. The associations between each of the three measures of viral suppression (both HIV-positive and HIV-negative partners’ self-reports and viral load blood test result for the HIV-positive partner) and sexual risk behavior were tested using multinomial logistic regression. Because the three measures of viral suppression were correlated, we fit three separate models for each explanatory variable. Prior research from the Duo Project found no significant demographic differences in intradyadic sexual behavior among serodiscordant couples;[8] thus, the models only controlled for relationship duration. Finally, we used dominance analysis,[9] a statistical technique to identify which of the three predictors was the most important predictor of sexual risk. The relative importance of a predictor is based on the effect size (i.e., the dominance weight), which is calculated by taking the average pseudo-R^2 explained by each predictor across multiple regression models containing all possible

subsets of predictors. Each predictor competes against the others to predict the outcome and then is ranked in terms of importance. This approach overcomes problems of multicollinearity when predictors are highly correlated. Additionally, dominance analysis estimates whether a predictor consistently outperforms another predictor using the categories of *general* dominance (least dominant), *conditional* dominance (somewhat dominant), and *complete* dominance (most dominant). In this study, we observed *complete* dominance, which means that the amount of variance explained in sexual risk by one predictor (i.e., HIV-negative partner self-reports) was greater in size than the variance explained by the other two predictors (i.e., blood test results and HIV-positive partner self-reports). All analyses were conducted in Stata 14.

Results

The sample of 236 men (118 couples) was largely middle-aged (M = 46.6; SD = 10.9) and self-identified as white (61.4%). Slightly less than half of the sample (40.7%) reported earning less than $20,000 annually. Couples had been together an average of 7.4 years (SD = 7.8). Of the 118 HIV-positive men on ART, 92.4% reported that they were virally suppressed at last clinic visit, 62.4% were actually virally suppressed as indicated by blood tests, and 77.8% of their partners reported they believed that their HIV-positive partner was virally suppressed. Regarding sexual behavior, 13 couples (11.0%) had engaged in PAI in the past 3 months, 39 couples (33.0%) had engaged in CAI in the past 3 months, and 66 couples (55.9%) had no anal intercourse with their primary partner in the past 3 months.

As shown in Table 1, HIV-positive partner self-reports of viral suppression and blood test results were not significantly associated with sexual risk behavior. However, HIV-negative partner self-reports of viral suppression were positively associated with CAI (in reference to PAI; adjusted RR=5.34; 95% CI: 1.13–35.27; p=.035) and were positively associated with CAI (in reference to no anal intercourse; adjusted RR=3.39; 95% CI: 1.00–11.47; p=.049). In the dominance analysis, HIV-negative partner self-reports of viral suppression had the highest rank in terms of importance (#1; weight=.0244), followed by viral load blood test results (#2; weight=.0146) and HIV-positive partner self-reports of viral suppression (#3; weight=.0025). HIV-negative partner self-reports showed complete dominance over the HIV-positive partner self-reports and viral load blood test results—providing the strongest evidence of dominance for a given variable.

Comment

Findings suggest that HIV-negative partners' self-reports about their partner's viral suppression are more salient for sexual risk behavior than HIV-positive men's self-reports of viral suppression and blood test results. While we were limited to cross-sectional data and a convenience sample of same-sex male couples in primary partnerships, our analysis extends other research by using a dyadic framework to simultaneously examine two sides of a couple interaction. The results highlight that HIV-negative partners' beliefs about viral suppression may be central to the dyadic coordination of risky sex. Because partner beliefs of viral suppression may be inaccurate,[7] HIV-negative men may unknowingly place themselves at risk for HIV. While we could not directly assess this in our study, future studies with larger

samples of male couples should explore patterns and predictors of CAI with HIV-negative men who incorrectly assume their partner is virally suppressed. Furthermore, future research is needed to examine whether these findings can be generalized to samples of serodiscordant couples using pre-exposure prophylaxis (PrEP).

If the viral status of HIV-positive men is less influential in sexual decision-making within primary serodiscordant partnerships, the responsibility falls on HIV-negative partners to use condoms and take other measures, such as PrEP, for reducing risk. While ART may offer another layer of protection against HIV infection, its success will require that HIV-negative partners have up-to-date viral load information on their partners, and accurate information regarding viral load variability, drug-resistant strains of HIV, and factors that can interfere with the suppressive effects of ART. This point is critical and timely as ART becomes increasingly accessible worldwide and momentum builds for efforts to end AIDS through antiretroviral-based approaches.[10] Couple-based interventions that build communication skills and relationship dynamics are promising strategies,[11] which could equally serve both partners' needs by improving adherence, engagement in HIV care, and viral suppression while reducing sexual risk for those who are HIV-negative. Health care professionals should assess sexual practices and communication about viral load with partners in both HIV care and HIV/STI testing settings to facilitate a discussion of different prevention strategies depending on levels of risk.

Acknowledgments

Source of Funding:

This study was supported by grants from the National Institute of Nursing Research (R01NR010187), the National Institute of Drug Abuse (K24DA037034), and the National Institute of Mental Health (K01MH107331; T32MH078788).

We would like to thank the men who participated in the study and the tireless efforts of the research staff.

References

1. Cohen M, Chen Y, McCauley M, et al. Prevention of HIV-1 Infection with Early Antiretroviral Therapy. N. Engl. J. Med. 2011; 365(6):493–505. [PubMed: 21767103]
2. Horvath KJ, Smolenski D, Iantaffi A, et al. Discussions of viral load in negotiating sexual episodes with primary and casual partners among men who have sex with men. AIDS Care. 2012; 24(8): 1052–1055. [PubMed: 22519740]
3. Holt M, Lea T, Mao L, et al. HIV Prevention by Australian Gay and Bisexual Men With Casual Partners: The Emergence of Undetectable Viral Load as One of a Range of Risk Reduction Strategies. J Acquir Immune Defic Syndr. 2015; 70(5):545–548. [PubMed: 26258572]
4. Prestage G, Mao L, Kippax S, et al. Use of Viral Load to Negotiate Condom Use Among Gay Men in Sydney, Australia. AIDS Behav. 2009; 13:645–651. [PubMed: 19199021]
5. Van de Ven P, Mao L, Fogarty A, et al. Undetectable viral load is associated with sexual risk taking in HIV serodiscordant gay couples in Sydney. AIDS. 2005; 19:179–184. [PubMed: 15668543]
6. Lewis MA, McBride CM, Pollak KI, et al. Understanding health behavior change among couples: An interdependence and communal coping approach. Soc. Sci. Med. 2006; 62:1369–1380. [PubMed: 16146666]
7. Conroy AA, Gamarel KE, Neilands TB, et al. Relationship Dynamics and Partner Knowledge of Viral Suppression: A Longitudinal Study on Male Couples Living with HIV/AIDS (The Duo Project). AIDS Behav. 2016; 20(7):1572–1583. [PubMed: 27150895]

8. Gamarel KE, Starks TJ, Dilworth SE, et al. Personal or Relational? Examining Sexual Health in the Context of HIV Serodiscordant Same-Sex Male Couples. AIDS Behav. 2014; 18:171–179. [PubMed: 23636681]
9. Azen R, Budescu DV. The dominance analysis approach for comparing predictors in multiple regression. Psychol. Methods. 2003; 8(2):129–148. [PubMed: 12924811]
10. UNAIDS. 90-90-90: An ambitious treatment target to help end the AIDS epidemic. Geneva, Switzerland: UNAIDS; 2014.
11. Burton J, Darbes LA, Operario D. Couples-focused behavioral interventions for prevention of HIV: Systematic review of the state of evidence. AIDS Behav. 2010; 14:1–10. [PubMed: 18843530]

Table 1

Relative risk ratios and 95% confidence intervals from multinomial logistic regression models for sexual risk behavior (N=236 individuals; 118 couples)

Explanatory variable	Condomless anal intercourse vs. protected anal intercourse			No anal intercourse vs. protected anal intercourse			Condomless anal intercourse vs. no anal intercourse		
	RR	95% CI	*p*	RR	95% CI	*p*	RR	95% CI	*p*
HIV-positive partner									
Self-reported viral suppression	3.27	0.39–26.89	0.270	1.83	0.25–13.62	0.554	1.78	0.27–11.48	0.542
Blood test viral suppression	3.32	0.89–12.50	0.075	2.37	0.66–8.53	0.184	1.40	0.59–3.33	0.448
HIV-negative partner									
Belief about partner's viral suppression	5.34	1.13–35.27	0.035	1.57	0.41–6.04	0.508	3.39	1.00–11.47	0.049

RR=Relative-risk ratio. Three multinomial regression models were fit for each explanatory variable, controlling for couple-level relationship duration.