Prevalence and Correlates of Sexual Behavior and Risk Management Among HIV-Positive Adults Over 50

Sarit A. Golub, PhD, MPH,*†‡ Julia C. Tomassilli, PhD,†‡ David W. Pantalone, PhD,§ Mark Brennan, PhD,¶ Stephen E. Karpiak, PhD,¶ and Jeffrey T. Parsons, PhD*†‡

Background: This study examined the prevalence and correlates of sexual behavior, sexual risk, and behavioral risk reduction strategies among a diverse sample of HIV-positive adults over age 50.

Methods: Individual surveys were conducted with 914 HIV-positive adults age 50 and over (640 male, 264 female, 10 transgender) living in New York City.

Results: Over half the sample reported sexual activity in the past 3 months, and one-third of sexually active participants reported unprotected anal or vaginal sex in that time period. Sexually active participants were more likely to be younger and male, but did not differ on physical health status. Participants reported a range of risk-management strategies, including 100% condom use (49% of sexually active participants), serosorting (17%), and strategic positioning (4%). The prevalence of strategies differed by gender/sexual identity subgroups. In multivariate modeling, unprotected sex was significantly associated with recent substance use and loneliness.

Conclusions: Older HIV-positive adults are sexually active, and engage in both high-risk and risk-management behaviors. Loneliness emerged as the dominant risk factor in this sample. Findings provide meaningful implications for HIV prevention interventions targeting this population.

Over one quarter of people living with HIV/AIDS in the United States are over 50 years old.[1] The rising proportion of HIV-positive individuals in this age bracket—this number increased 550% from 1990 to 2001[2]—is due in part to advances in the treatment and management of HIV disease, including widespread dissemination of antiretroviral medications[3] and improvements in HIV-related medical care.[4] Simultaneously, demographic and cultural changes may contribute to increasing rates of new infection among older adults; the number of new infections in this age group increased 28% between 2004 and 2007.[5] The Centers for Disease Control and Prevention (CDC) has estimated that by 2015 about half of individuals living with HIV/AIDS will be 50 and above.[5]

Similar to their HIV-negative counterparts, older adults with HIV are sexually active, and engage in unprotected intercourse.[6–8] Between 42% and 33% of sexually active HIV-positive adults report unprotected anal or vaginal intercourse, with correlates of irregular condom use including less knowledge about HIV/AIDS and recent substance use.[6,7] Slightly different rates and patterns of sexual risk behavior have been reported among older HIV-positive adults by gender and sexual orientation, with higher rates being reported among gay/bisexual men.[9] However, few studies have explored older adults' use of other risk reduction strategies, such as serosorting or strategic positioning, that have been investigated in other HIV-positive populations.[9–12]

Although HIV secondary prevention efforts have been targeted to multiple at-risk populations, few intervention trials have focused specifically on the unique needs of older adults.[13,14] A better understanding of the patterns and correlates of sexual behavior among HIV-positive older adults is critical to the development of effective intervention strategies tailored to this population and its high risk subgroups.[4] Poor physical health,[15] poor psychological well-being, and substance use are risk factors for unprotected sex across populations, and have been implicated in the behavior patterns of HIV-positive adults specifically.[6,7,16] Social isolation and low levels of social support are more common among older HIV-positive persons, compared to their younger counterparts,[17,18] complicating both opportunities and motivation for sexual encounters.

In this article, we investigate the prevalence and correlates of sexual behavior among a diverse sample of HIV-positive adults over age 50. We focus on predictors of sexual activity and sexual risk, defined as unprotected anal or vaginal sex. In addition, this study describes specific risk management strategies utilized by sexually active HIV-positive older adults to reduce the possibility of transmitting the virus to their sexual partners. We compare the prevalence of different risk management strategies across gender/sexual identity subgroups to identify differences in the likelihood of using each strategy. Finally, this study uses multivariate modeling to estimate the significance of demographic, physical health, mental health, and substance use variables in predicting the likelihood of sexual activity and unprotected sex among HIV-positive older adults. Predictors were chosen for their association with sexual risk in previous research, and because of their particular relevance to older HIV-positive persons.

METHODS

Procedure and Sample

Data were drawn from the Research on Older Adults with HIV (ROAH) project, a cross-sectional survey study conducted in New York City from March to October 2005.[19] Participants were recruited by the AIDS Community Research Initiative of America (ACRIA) through New York City AIDS services organizations (ASOs), public and private hospitals, and the agency's own database of clients. Participation was restricted to HIV-positive individuals who resided in or received health care in New York City, were community-dwelling (i.e., not institutionalized), and were able to complete the survey instrument in English. A total of 914 participants met these criteria and completed the survey. Informed consent was obtained in writing, and all study procedures were approved by the Copernicus Group Institutional Review Board. Data were collected using self-administered pen and paper questionnaires which took approximately 1.5 hours to complete. Participants were reimbursed $25 for participation.

Measures

Sexual Risk Behavior. Participants answered a series of gender-specific questions regarding their sexual behaviors in the past 90 days. Participants were asked to report the number of times they had engaged in each type of sexual activity (oral, anal, or vaginal intercourse; insertive or receptive; protected or unprotected) by partner type (main or nonmain) and by serostatus (HIV-negative, -positive, or unknown status). Based on these data, we created 2 summary dichotomous variables used as the primary outcomes of our analyses: any sexual activity in the past 3 months (including any instance of oral, anal, and/or vaginal sex) and any unprotected anal or vaginal sex in the past 3 months (regardless of the partner's serostatus). We also created 6 dichotomous variables designed to capture patterns of risk management strategies used by HIV-positive older adults in the past 3 months. HIV-Positive Partners Only: these individuals had exclusively HIV-positive partners, regardless of the number of partners they had or the type of sexual behavior in which they engaged. Oral Sex Only: these individual engaged only in oral sex (insertive or receptive), regardless of partner serostatus. One Hundred Percent Condom Use: these individuals engaged in vaginal or anal sex in the past 3 months, but used condoms every time, regardless of partner serostatus. Serosorting: these individuals reported at least 1 episode of unprotected anal or vaginal sex with an HIV-positive partner, but reported no unprotected anal or vaginal sex with HIV-negative or HIV-status unknown partner. Strategic Positioning: this category was restricted to men who have sex with men (MSM) and included individuals who reported unprotected receptive anal sex with serodiscordant partners, but no unprotected insertive sex with serodiscordant partners. No Risk Management: these individuals reported at least 1 act of unprotected anal or vaginal sex with an HIV-negative or HIV-status unknown partner.

Substance Use. Participants were asked about the use of 10 drugs (cocaine, crack, crystal meth, ecstasy, GHB, heroin, ketamine, LSD, and marijuana). For each drug, participants were asked whether they had used it ever, in the last 3 months, and with sex in the last 3 months ($1 =$ yes; $0 =$ no). Two composite dichotomous variables were created: any drug use in the past 3 months (yes/no) and any drug use during sex in the past 3 months (yes/no).

Physical Health. Participants indicated whether they had ever received an AIDS diagnosis, and whether they had experienced any of a series of health problems in the past year, including arthritis, diabetes, heart disease, and neuropathy. These were dichotomized into 3 variables: AIDS diagnosis, comorbidity, and neuropathy (for each variable, $1 =$ yes, $0 =$ no).

Mental Health. Participants completed the Center for Epidemiologic Studies Depression Scale (CES-D[20]), the UCLA Loneliness Scale,[21] and the HIV Stigma Scale.[22] Cronbach α tests for internal consistency for all scales ranged from 0.83 to 0.96 in this sample.

Demographics. Participants completed a series of demographic measures including: gender, sexual orientation, age, and race/ethnicity. Participants also indicated whether they were living with a spouse or partner ($1 =$ yes; $0 =$ no).

Statistical Analysis

Pearson chi-squared tests were conducted to examine associations between demographic variables, physical health, substance use, and sexual behavior. Multivariate logistic regression was performed to identify predictors of 2 primary dichotomous outcome measures: sexual activity in the past 3 months and unprotected anal or vaginal sex in the past 3 months. The goal of these analyses was to identify a set of predictors for both outcomes that satisfied both parsimony and goodness of fit. Consistent with procedures outlined by Hosmer and Lemeshow,[23] variables with P values less than 0.25 in bivariate testing were entered into the multivariate logistic model. Using a backward stepwise procedure, predictors with adjusted P-values greater than 0.20 were removed from the final model. The Hosmer–Lemeshow goodness of fit test was used to assess model fit. All analyses were conducted using SPSS.

RESULTS

Demographics

Nine hundred and fourteen HIV-positive adults over age 50 (640 male, 264 female, 10 transgender [7 male-to-female; 3 female-to-male]) completed the survey. Participants ranged in age from 50 to 78 (median $= 54$; IQR: 52–58). Half of participants ($n = 455$) were black, 32.7% ($n = 299$) were Latino/a, 12.8% ($n = 116$) were white, and 4.6% reported another race (Asian Pacific Islander, Native American, Multiracial) or refused to answer. Almost two-thirds of the sample (63.1%, $n = 577$) self-identified as heterosexual. Over 20% of the sample ($n = 195$) had not finished high-school, 29.5% ($n = 270$) were high-school graduates, and 21.3% ($n = 195$) reported having received a college or vocational degree. Sixty-nine percent ($n = 631$) reported living alone, and 14.7% ($n = 134$) reported living with a romantic partner. The majority of participants (66.7%) had been living with HIV for more than 10 years, and half ($n = 463$) had received an AIDS diagnosis. Over 85% ($n = 778$) reported currently taking antiretroviral medications.

Sexual Behavior

A total of 458 participants (50.1%) reported being sexually active in the past 90 days. Of these sexually active participants, 19 (2%) declined to report any information about the type of sexual behavior in which they engaged, and were excluded from further analysis. The median number of sex acts reported in the past 90 days was 19 (range: 1–606, IQR: 6–56) and the median number of anal or vaginal sex acts was 12

TABLE 1. Summary of Demographic Comparisons by Sexual Activity and Sexual Risk

| | All Participants (N = 914)* | | | | | Sexually Active Participants (N = 439)† | | | | |
| | Not Sexually Active | | Sexually Active | | | No Unprotected Sex | | Unprotected Sex | | |
	n	%	n	%	$P^‡$	n	%	n	%	$P^‡$
Gender					0.00					0.31
Male (n = 640)	289	45.2	351	54.8		218	64.3	121	35.7	
Female (n = 264)	160	60.6	104	39.4		67	69.1	30	30.9	
Transgender (n = 10)	7	70.0	3	30.0		3	100	0	0	
Age					0.02					0.27
50–54 (n = 472)	224	47.5	248	52.5		148	63.2	86	36.8	
55–59 (n = 276)	133	48.2	143	51.8		94	67.6	45	32.4	
60–64 (n = 109)	60	55.0	49	45.0		31	63.3	18	36.7	
65+ (n = 52)	36	69.2	16	30.8		13	86.7	2	13.3	
Race					0.80					0.16
African-American (n = 455)	226	49.7	229	50.3		140	63.1	82	36.9	
Latino/a (n = 299)	151	50.5	148	49.5		98	69.0	44	31.0	
White (n = 116)	60	51.7	56	48.3		31	59.6	21	40.4	
Other (n = 44)	19	43.2	25	56.8		19	82.6	4	17.4	
Sexual orientation					0.07					0.91
Heterosexual (n = 577)	301	52.2	276	47.8		175	65.8	91	34.2	
Gay/bisexual (n = 337)	155	46.0	182	54.0		113	65.3	60	34.7	
Living with partner					0.00					0.53
Yes (n = 134)	48	35.8	86	64.2		52	62.7	31	37.3	
No (n = 780)	408	52.3	372	47.7		236	66.3	120	33.7	
Diagnosed with AIDS					0.82					0.63
Yes (n = 463)	233	50.3	230	49.7		146	66.7	73	33.3	
No (n = 440)	218	49.5	222	50.5		138	64.5	76	35.5	
Taking HIV meds					0.44					0.46
Yes (n = 778)	384	49.4	394	50.6		246	65.1	132	34.9	
No (n = 134)	71	53.0	63	47.0		42	70.0	18	30.0	

*Within demographic comparisons, totals may not add up to 904 or 439 because some participants refused to answer specific demographic questions.
†Nineteen participants are excluded from this analysis because they reported being sexually active, but did not report any other information about their sexual behavior.
‡P values are associated with χ^2 tests with df = 2(r-1), where r is the number of categories for each variable.

(range: 1–320, IQR: 4–29). Forty-nine percent of sexually active participants (25% of the total sample) reported sexual behavior at least 2 to 3 times per week.

Table 1 shows demographic characteristics stratified by sexual activity (any oral, anal, or vaginal sex in the past 90 days) and by sexual risk (any unprotected anal or vaginal sex in the past 90 days). Sexually active participants were more likely to be male, under age 60, and living with a romantic partner. A greater proportion of gay and bisexual participants (54.0%) reported sexual activity compared to heterosexual participants (47.8%), but this difference did not reach statistical significance (P = 0.07). There were no significant differences in sexual activity by race/ethnicity, history of AIDS diagnosis, or HIV medication status. Among sexually active participants, there were no demographic differences between those reporting unprotected sex and those reporting only protected sex.

Risk Management Strategies

Table 2 presents the 6 dichotomous variables designed to capture risk management strategies used by sexually active older HIV-positive adults, as well as their recent substance use. Chi-square comparisons are presented on the frequency of each risk management strategy across gender and sexual identity

subgroups. In the case of a significant 3 × 2 chi-square, individual 2 × 2 comparisons were conducted to examine differences between each pair of subgroups. Overall, 38% of participants reported exclusively HIV-positive sexual partners. This percentage was significantly higher among women (60%), compared to heterosexual men (35%) or gay/bisexual men (27%) (P < 0.001). The remaining 5 risk management strategies represent mutually exclusive categories, and are presented in ascending order of risk. One-hundred percent condom use was the most common risk management strategy overall (49% of sexually active participants reported this strategy), but was significantly less common among gay/bisexual men (35%), compared to heterosexual men (60%) and women (49%) (P < 0.001). Serosorting—that is, engaging in unprotected anal or vaginal sex, but only with HIV-positive partners—was reported by 17% of participants, and did not differ significantly by gender/sexual identity subgroup. Strategic positioning (relevant to MSM only) —that is, engaging in unprotected receptive anal sex with serodiscordant partners but not engaging in unprotected insertive anal sex with serodiscordant partners—was reported by 11% of gay/bisexual men. Finally, 14% of sexually active participants reported no risk management strategy—that is, they reported engaging in at least 1 instance of unprotected

TABLE 2. Risk Behavior of Sexually Active Participants by Gender and Sexual Orientation

	Total (n = 424) Number (%)	Heterosexual Men (n = 191) Number (%)	Gay/Bisexual Men (n = 136) Number (%)	Women (n = 97) Number (%)	P*
Partner type					
HIV+ only	162 (38)	67 (35)[†]	37 (27)[†]	58 (60)[†]	0.00
Risk management					
Oral sex only	70 (17)	11 (6)[†]	39 (29)[†]	20 (21)[†]	0.00
100% condom use	209 (49)	115 (60)[†]	47 (35)[†]	47 (49)[†]	0.00
Serosorting	71 (17)	34 (18)	15 (11)	22 (23)	0.06
Strategic positioning	15 (4)	N/A	15 (11)	N/A	—-
No risk management	59 (14)	31 (16)	20 (15)	8 (8)	0.17
Substance use					
Drug use in past 90 d	181 (45)	77 (45)[†]	70 (53)[†]	34 (36)[†]	0.04
Drug use during sex	143 (36)	61 (36)[†]	59 (45)[†]	23 (24)[†]	0.01

*P values are associated with χ^2 tests across rows with df = 2. Individual χ^2 comparisons were made when the omnibus $P < 0.05$.
[†]Values with different superscripts differ significantly from each other at the $P < 0.05$ level.
Serosorting is defined as unprotected sex only with HIV+ partners; strategic positioning refers to MSM and is defined as practicing only unprotected anal *receptive* sex with serodiscordant partners.

anal or vaginal sex with a serodiscordant partner in the past 90 days. Percentages of participants who reported no risk management strategy did not differ significantly by gender/sexual identity subgroup. Forty-five percent of participants reported drug use in the past 90 days. Gay/bisexual men were the most likely to report drug use (53%) and women were the least likely (36%) ($P < 0.05$). Thirty-six percent of participants reported drug use during sex in the past 90 days. Gay/bisexual men were the most likely to report drug use during sex (45%) and women were the least likely (24%) ($P = 0.01$).

Predictors of Sexual Activity and Unprotected Sex

Multivariate logistic regression analyses were conducted to examine the association between predictor variables and each of the 2 main outcome variables: sexual activity in the past 3 months and unprotected anal/vaginal sex in the past 3 months (Table 3). Both models showed adequate goodness of fit. Significant predictors of sexual activity included being male, living with a partner, and using drugs. Being over age 60 was associated with decreased odds of sexual activity, as were higher scores on the loneliness scale. Physical health variables did not predict sexual activity in the past 3 months. Significant predictors of unprotected sex in the past 3 months included only higher scores on the loneliness scale and using drugs with sex. Every unit increase in participants' scores on the loneliness scale increased their odds of unprotected sex by 3%. Individuals who used drugs with sex had over twice the odds of reporting unprotected sex (OR: 2.5; 95% CI: 1.6–3.9).

DISCUSSION

In this sample of HIV-positive adults over age 50, more than half were sexually active and one quarter (approximately half of all sexually active participants) reported sexual activity at least 2 to 3 times per week. These percentages are slightly lower than those found among HIV-negative older adults,[15] but are consistent with reports of other investigations of HIV-positive older adults.[6,7] Both heterosexual and gay/bisexual men were more likely to be sexually active compared to women, and adults over 60 were less likely to be sexually active than those ages 50 to 59. Participants who reported recent drug use were more likely to be sexually active. In contrast to other research on the sexual behavior of

HIV-negative older adults,[15] sexual activity in this sample was not associated with physical health measures. In bivariate analyses, sexually active participants were significantly less lonely and less depressed. In the multivariate model, loneliness was the only mental health factor that remained—such that individuals with lower loneliness scores were more likely to be sexually active.

Over one-third of sexually active participants reported unprotected anal or vaginal sex in the past 3 months, and 18% reported unprotected sex specifically with serodiscordant partners. This level of risk-taking is consistent with that reported elsewhere for this population,[6] and underscores the importance of addressing sexual risk with older HIV-positive patients. In multivariate modeling, the 2 significant predictors of unprotected sex were having sex under the influence of drugs and loneliness, such that higher loneliness scores predicted a greater likelihood of unprotected sex. More detailed analyses of substance use patterns in this population are available elsewhere,[24] but these findings emphasize the importance of assessing and addressing substance use with older HIV+ adults. The importance of loneliness to sexual behavior is corroborated by other studies that have identified loneliness as a risk factor for unprotected sex.[25–27] It is important to note that loneliness emerged as a significant predictor in both multivariate models; sexually active participants were less lonely than their non-sexually active counterparts, but loneliness was associated with increased risk for unprotected sex among sexually active participants. Although the cross-sectional nature of these data do not permit any claims of direction or causality, loneliness does appear to be an important factor in the sexual lives of HIV-positive older adults. Given the well-documented, high rates of social isolation and loneliness among older adults living with HIV,[18,28] the complex nature of the relationship between loneliness and sexual behavior/sexual risk among older adults is critical to the development of risk reduction interventions for this population.

Sexually active HIV-positive older adults reported a range of sexual risk-management strategies, ranging from 100% condom use (almost half of sexually active participants) to strategic positioning (4% of sexually active participants). The prevalence of risk management strategies differed by gender/sexual identity subgroups, suggesting the importance of targeting information about risk management to particular cohorts. The majority of research on risk management strategies has focused on younger men who have sex with men[9,12,29]; the data from this study indicate the potential for engaging older

TABLE 3. Predictors of Sexual Activity and Unprotected Anal/Vaginal Sex in the Past 3 Months

	Sexually Active—All Participants			Unprotected Sex—All Sexually Active Participants		
	Number	%Yes/M Yes	Adjusted OR (95% CI)*	Number	%Yes/M Yes	Adjusted OR (95% CI)[†]
Overall	811	51.3		395	33.9	
Demographics						
Gender/sexual orientation						
Women	253[†]	49.9	1.0	93[†]	31.2	‡
Gay/bisexual men	231[†]	59.7	2.6 (1.8, 3.8)***	131[†]	34.4	
Straight men	327[†]	54.1	2.0 (1.4, 2.8)***	171[†]	35.1	
Ethnicity						
African American	415	51.6	§	207[†]	35.7	1.0
Latino	257	50.2		123[†]	30.9	0.7 (0.4, 1.2)
White	104	50.0		46[†]	39.1	‡
Other	35	60.0		19[†]	21.1	0.4 (0.1, 1.2)
Age						
50–54	424[†]	54.5	1.0	216	58.2	§
55–59	250[†]	51.2	‡	122	32.0	
60 and older	137[†]	41.6	0.6 (0.4, 0.9)*	56	30.4	
Living with partner						
No	686[†]	49.3	1.0	321[†]	33.0	‡
Yes	125[†]	62.4	1.9 (1.2, 2.8)**	74[†]	37.8	
Physical health						
AIDS diagnosis						
No	385	51.4	§	189	34.4	§
Yes	419	51.1		203	33.0	
Comorbidity						
No	448	52.0	§	224	35.7	§
Yes	361	50.4		171	31.6	
Neuropathy						
No	560	51.8	§	278	33.1	‡
Yes	249	50.2		117	35.9	
Mental health						
Loneliness	811[†]	42.5	0.97 (0.96, 0.98)***	395[†]	44.9	1.03 (1.01, 1.06)**
Stigma	804	88.2	§	395[†]	91.6	‡
Depression	811[†]	19.2	‡	395	19.7	§
Drug use						
Drug use						
No	513[†]	44.4	1.0	219[†]	25.6	‡
Yes	298[†]	63.1	2.1 (1.6, 2.9)***	176[†]	44.3	
Used drugs with sex						
No	‖	‖	‖	255[†]	26.3	1.0
Yes				140[†]	47.9	2.5 (1.6, 3.9)***
Hosmer–Lemeshow goodness of fit, χ^2 (df), P			7.34 (8), 0.50			13.9 (8), 0.08

*$P < .05$; **$P < .01$; ***$P < .001$.
[†]Adjusted for those variables in the final model.
[‡]Variables are excluded in the final model in backward stepwise selection procedure, adjusted $P > 0.20$.
[§]Variables are not entered into the model.
‖Not applicable.
OR indicates odds ratio; CI, confidence interval. $P < 0.25$ in bivariate χ^2 and t-tests and factor qualified to be entered in multiple logistic model.

HIV-positive adults across gender and sexual identity in strategies for sexual risk management.

Our findings are subject to several limitations. These data were collected in New York City and, as such, may not be representative of HIV-positive older adults living in different (especially less urban) areas. In addition, this sample was recruited from ASOs and may represent a particular subgroup of HIV-positive older adults who are connected to HIV-related services. Survey data did not include questions regarding the number of sexual partners of each type (e.g., HIV-positive men, HIV-negative women, etc) which may important to a better understanding of risk behavior and risk management strategies in this population. It is also possible that our "no risk management" category included individuals who were engaging in risk management strategies not captured by these data, including limiting their number of partners. These data are cross-sectional and, therefore, do not allow for any causal interpretation of the link between loneliness and sexual risk. Further, although self-reports of sexual behavior have been found to be reliable in terms of both internal consistency and convergent validity,[30,31]

it is possible that participants underreported sexual behavior, sexual risk, or substance use. However, our findings are consistent with previous studies of HIV-positive older adults recruited by other methods[7] and in other cities,[6] suggesting that data from this large and diverse sample provide important and reliable information about sexual behavior patterns in this significant and growing population.

The results from this study underscore the importance of incorporating prevention information and interventions into standard medical care or social services programs for older adults living with HIV. Only one-third of men and one-fifth of women report ever having discussed sexuality with a physician after the age of 50,[15] and physicians and other health care providers are less likely to discuss HIV-related risk and prevention information with their older patients.[32,33] Provider education programs and interventions that target specific correlates of risk behavior among older adults are greatly needed. Specifically, greater attention should be made to perceptions regarding risk-management among HIV+ adults, including specific education regarding the risks associated with particular strategies over time. This study suggests a pivotal role for loneliness in the sexual behavior of older adults, and pilot interventions for older adults have targeted loneliness as an important outcome.[34] Future studies should examine the relations between loneliness and sexual behavior prospectively, to better understand temporal changes as well as the mechanisms behind this association. These findings suggest that sexually active HIV-positive older adults are engaging in risk management and risk reduction behaviors. HIV researchers and providers should work quickly to develop strategies to best support them in these efforts.

REFERENCES

1. CDC. HIV/AIDS Surveillance Report, 2007. Atlanta, GA: Department of Health and Human Services, Centers for Disease Control and Prevention, 2009.
2. Mack KA, Ory MG. AIDS and older Americans at the end of the twentieth century. J Acquir Immun Defic Syndr 2003; 33(suppl 2):S68–S75.
3. Karpiak SE, Shippy RA, Cantor MH. Research on older adults with HIV. New York, NY: AIDS Community Research Initiative of America, 2006.
4. Bhavan KP, Kampalath VN, Overton ET. The aging of the HIV epidemic. Curr HIV/AIDS Rep 2008; 5:150–158.
5. CDC. HIV prevalence estimates—-United States, 2006. MMWR Morb Mortal Wkly Rep 2006; 57:1073–1076.
6. Lovejoy TI, Heckman TG, Sikkema KJ, et al. Patterns and correlates of sexual activity and condom use behavior in persons 50-plus years of age living with HIV/AIDS. AIDS Behav 2008; 12:943–956.
7. Cooperman NA, Arnsten JH, Klein RS. Current sexual activity and risky sexual behavior in older men with or at risk for HIV infection. AIDS Educ Prev 2007; 19:321–333.
8. Schable B, Chu SY, Diaz T. Characteristics of women 50 years of age or older with heterosexually acquired AIDS. Am J Public Health 1996; 86:1616–1618.
9. Mizuno Y, Purcell DW, Latka MH, et al. Is sexual serosorting occurring among HIV-positive injection drug users? Comparison between those with HIV-positive partners only, HIV-negative partners only, and those with any partners of unknown status. AIDS Behav 2010; 14:92–102.
10. Parsons JT, Schrimshaw EW, Wolitski RJ, et al. Sexual harm reduction practices of HIV-seropositive gay and bisexual men: Serosorting, strategic positioning, and withdrawal before ejaculation. AIDS 2005; 19(suppl 1):S13–S25.
11. Morin SF, Shade SB, Steward WT, et al. A behavioral intervention reduces HIV transmission risk by promoting sustained serosorting practices among HIV-infected men who have sex with men. J Acquir Immun Defic Syndr 2008; 49:544–551.
12. Halkitis PN, Moeller RW, Pollock JA. Sexual practices of gay, bisexual, and other nonidentified MSM attending New York City gyms: Patterns of serosorting, strategic positioning, and context selection. J Sex Res 2008; 45:253–261.
13. Coleman CL, Jemmott L, Jemmott JB, et al. Development of an HIV risk reduction intervention for older seropositive African American men. AIDS Patient Care STDS 2009; 23:647–655.
14. Coon DW, Lipman PD, Ory MG. Designing effective HIV/AIDS social and behavioral interventions for the population of those age 50 and older. J Acquir Immun Defic Syndr 2003; 33(suppl 2):S194–S205.
15. Lindau ST, Schumm LP, Laumann EO, et al. A study of sexuality and health among older adults in the United States. NEngl J Med 2007; 23:357:762–774.
16. Kwiatkowski CF, Booth RE. HIV risk behaviors among older American drug users. J Acquir Immun Defic Syndr 2003; 33(suppl 2):S131–S137.
17. Crystal S, Akincigil A, Sambamoorthi U, et al. The diverse older HIV-positive population: A national profile of economic circumstances, social support, and quality of life. J Acquir Immun Defic Syndr 2003; 33(suppl 2):S76–S83.
18. Shippy RA, Karpiak SE. The aging HIV/AIDS population: Fragile social networks. Aging Ment Health 2005; 9:246–254.
19. Brennan M, Karpiak SE, Shippy RA, et al, eds. Older Adults With HIV: An In-Depth Examination of an Emerging Population. Hauppauge, NY: Nova Publishers. In press.
20. Radloff LS. The CES-D scale: A self-report depression scale for research in the general population. Appl Psychol Meas 1977; 1:385–401.
21. Russell DW. UCLA Loneliness Scale (Version 3): Reliability, validity, and factor structure. J Pers Assess 1996; 66:20–40.
22. Berger BE, Ferrans CE, Lashley FR. Measuring stigma in people with HIV: Psychometric assessment of the HIV stigma scale. Res Nurs Health 2001; 24:518–529.
23. Hosmer DW, Lemeshow S. Applied Logistic Regression. New York, NY: John Wiley & Sons, 1989.
24. Applebaum A, Brennan M. Substance and alcohol use. In: Reference no. 19.
25. Martin JI, Knox J. Loneliness and sexual risk behavior in gay men. Psychol Rep 1997; 81(3 pt 1):815–825.
26. Parsons JT, Halkitis PN, Wolitski RJ, et al. Correlates of sexual risk behaviors among HIV-positive men who have sex with men. AIDS Educ Prev 2003; 15:383–400.
27. Munoz-Laboy M, Hirsch JS, Quispe-Lazaro A. Loneliness as a sexual risk factor for male Mexican migrant workers. Am J Public Health 2009; 99:802–810.
28. Brennan M, Applebaum A. Loneliness among older adults with HIV. In: Reference no. 19.
29. Jin F, Crawford J, Prestage GP, et al. Unprotected anal intercourse, risk reduction behaviours, and subsequent HIV infection in a cohort of homosexual men. AIDS 2009; 23:243–252.
30. James NJ, Bignell CJ, Gillies PA. The reliability of self-reported sexual behaviour. AIDS 1991; 5:333–336.
31. Fishbein M, Pequegnat W. Evaluating AIDS prevention interventions using behavioral and biological outcome measures. Sex Transm Dis 2000; 27:101–110.
32. Akers A, Bernstein L, Henderson S, et al. Factors associated with lack of interest in HIV testing in older at-risk women. J Womens Health (Larchmt) 2007; 16:842–858.
33. Strombeck R, Levy JA. Educational strategies and interventions targeting adults age 50 and older for HIV/AIDS prevention. Res Aging 1998; 20:912–936.
34. Heckman TG, Barcikowski R, Ogles B, et al. A telephone-delivered coping improvement group intervention for middle-aged and older adults living with HIV/AIDS. Ann Behav Med 2006; 32:27–38.