| **Author, year** | **Type of study** | **Location/setting/high or low prevalence population (based on 0.1% prevalence rate)** | **Study duration/**  **followup** | **Comparison groups** | **Demographics/baseline disease** |
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| Del Romero et al, 201093 | Cross sectional and prospective cohort | Madrid, Spain; HIV clinic; high; no ART 9.2%, ART 8.7%; 9% HIV prevalence among partners whose index partner was not on ART, 0% in those on ART | 1989–2008; 1355 couple-years accrued in prospective cohort | ART vs. no ART | Index cases 83% male; female median age, 29 years; male median age, 32 years; median CD4 count, 500 x 109 cells/L (IQR, 295–700); median plasma HIV RNA, 200 copies/mL (IQR, nondetectable to 8876); 54% detectable viral load; median known duration of HIV infection, 29 months (IQR, 3–94) |
| Diamond et al, 200594 | Cross sectional of patients randomly selected for clinic trial | California; HIV clinic; not reported | October 1998 to September 1999; baseline visit data | ART vs. no ART | 45% ages <37 years; 88% male; 39% white, 37% Latino, 16% black, 8% Asian/Pacific Islander/American Indian/Alaska native/other; HIV exposure: 62% homosexual sex, 16% heterosexual sex, 10% injection drug use, 9% both homosexual sex and injection drug use, 3% transfusion/other/don't know; 22% current CD4 count 0–199 x 109 cells/L, 45% current CD4 count 200–499 x 109 cells/L, 32% current CD4 count >500 x 109 cells/L; 42% recent undetectable viral load; 65% with 1 sex partner in past 3 months, 13% with 2 sex partners in past 3 months, 22% with >3 sex partners in past 3 months; 48% sex with main partner only in past 3 months, 46% sex with casual exchange partner in past 3 months, 6% sex with exchange partner in past 3 months; 34% unprotected anal/vaginal intercourse in past 3 months; 79% using ART; 74% taking >95% of medication; median time from diagnosis of HIV infection, 6 years (range, 0–18) |
| Elford et al, 200795; Elford et al, 2006100 | Cross sectional | London, UK; HIV clinic; 17,000 gay men, 13,000 black African heterosexual men and women with HIV (Elford 2006) | 4–6 month period in 2004–2005; once only data | ART use vs. no ART use | Gay men: median age, 39 years (range, 18–72); 85% white; 70.7% on ART; 61.2% undetectable viral load; median CD4 count, 350 x 109 cells/L (range, 0–999); 42.5% recreational drug use; median time since diagnosis, 6 years (range, 0–21)  Black African heterosexual: median age, 39 years (range, 18–69); 85.5% on ART; 59.2% undetectable viral load; median CD4 count, 150 x 109 cells/L (range, 0–999); 0% recreational drug use; median time since diagnosis, 3 years (range, 0–18)  Black African heterosexual women:median age, 36 years (range, 18–67); 75% on ART; 62.3% undetectable viral load; median CD4 count, 200 x 109 cells/L (range, 0–999); 0.2% recreational drug use; median time since diagnosis, 3 years (range, 0–20)  \*\*Significant differences between groups on age, use of ART, CD4 count, years since diagnosis, employment status, education, birth in the U.K., number of years in the U.K., relationship status, knowledge of partner's HIV status, partner's knowledge of index case's HIV status, access to the Internet, use of Internet to look for sexual partners, HIV treatment optimism |
| Miguez-Burbano et al, 200296 | Cross sectional embedded in RCT | Miami; community health and research clinic; not reported | RCT 1998–2001; behavioral questionnaire approved in 2000; RCT cohort followed 1998–2001 | ART use vs. no ART use | Mean age, 39.1 years (SD, 6); 57.6% male; 78% African American, 4% Caucasian, 17% Hispanic, 1% other (Haitian); 67% drug use (65% past use of injecting heroin, 46% past use of injecting cocaine); 65% heterosexual, 11% homosexual, 24% bisexual; 91% single, 9% stable partner; 31% not on ART, 47% on ART, 22% on ART but not taking it; 68% diagnosed before 1995, 8% diagnosed after 1999 (range, 1981–2000 [questionnaire approved in 2000]) |
| Morin et al, 200797 | Cross sectional | Various clinics throughout U.S.; Ryan White-funded clinics; not reported | April 2004 to December 2006; baseline interview data | ART vs. no ART | MSM: 51% white, 29% black/African American, 15% Hispanic/Latino, 5% other; 84% homosexual, 13% bisexual, 1% heterosexual, 2% unknown/no answer; 41% ages <39 years, 59% ages >40 years; 15% CD4 count <200 x 109 cells/L, 66% CD4 count >200 x 109 cells/L, 18% unknown CD4 count; 57% most recent viral load undetectable, 33% most recent viral load detectable, 10% most recent viral load unknown/no answer; 14% not currently on ART, 69% currently on ART, 18% unknown/no answer; 40% unprotected anal or vaginal sex in last 6 months; 4% injected any drug in last 30 days  Women:16% white, 68% black/African American, 11% Hispanic/Latino, 4% other; 3% homosexual, 5% bisexual, 89% heterosexual, 3% unknown/no answer; 41% ages <39 years, 59% ages >40 years; 14% CD4 count <200 x 109 cells/L, 57% CD4 count >200 x 109 cells/L, 29% unknown CD4 count; 52% most recent viral load undetectable, 34% most recent viral load detectable, 14% most recent viral load unknown/no answer; 18% not currently on ART, 60% currently on ART, 22% unknown/no answer; 27% unprotected anal or vaginal sex in last 6 months; 3% injected any drug in past 30 days  MSW: 15% white, 68% black/African American, 15% Hispanic/Latino, 2% other; <1% homosexual, 2% bisexual, 96% heterosexual, 1% unknown/no answer; 20% ages <39 years, 80% ages >40 years; 19%CD4 count <200 x 109 cells/L, 52% CD4 count >200 x 109 cells/L, 29% unknown CD4 count; 53% most recent viral load undetectable, 36% most recent viral load detectable, 11% most recent viral load unknown/no answer; 11% not currently on ART, 71% currently on ART, 18% unknown/no answer; 20% unprotected anal or vaginal sex in last 6 months; 7% injected any drug in last 30 days; no data on duration of HIV infection |
| Smit et al, 200698; van Haastrecht et al, 1991101 | Prospective cohort | Amsterdam; methadone maintenance outposts, sexually transmitted diseases clinic, word of mouth; assumed high prevalence (homosexual drug users in Amsterdam); high; adjusted prevalence rate was 34.1% among IDUs participating in study 1986–1989 (van Haastrecht, 1991) | December 1985 to ongoing Treatment, 8.08 years (range, 4.6–10.2)  Control: 7.98 years (range, 4.2–10.0) | ART use vs. no ART use | Treatment: 73% male; mean age, 40 years; 87% methadone users; 51% naive; median CD4 count, 185 x 109 cells/L  Control: 71% male; mean age, 38 years; 95% methadone users; 58% naive; median CD4 count, 0.200 x 109 cells/L; no data on duration of HIV diagnosis |
| Tun et al, 200499; Vlahov et al, 1991102; Vlahov et al, 2001103 | Before-after derived from prospective cohort | Baltimore; community outreach recruitment; high; 24% in population enrolled from 1988–1989 (Vlahov, 2001) | ALIVE cohort recruitment 1988–1989 and 1994 Present analysis: enrolled July 1996 to November 2000; followup to August 2001, occurrence of behavioral outcome or last study visit (variable durations) | ART vs. no ART | 70.5% male; 95.3% African American; median age at ART initiation, 44 years (IQR, 40–47); median CD4 count, 0.260 x 109 cells/L (IQR, 0.129–0.358 x 109); median HIV RNA level for 64% of sample, 23,709 copies/mL (2,184–10,4544); 20.0% with AIDS diagnosis prior to ART; 66.3% engaged in any sex 1 year prior to ART; 22.1% engaged in unprotected sex 1 year prior to ART; 52.6% injected drugs 1 year prior to ART; 20% shared needles 1 year prior to ART; no data on duration of HIV diagnosis |

| **Author, year** | **Eligibility criteria** | **Exclusion criteria** | **Number screened/ eligible/enrolled/ withdrawals/% analyzed** | **Virologic response** | **CD4 count response** |
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| Del Romero et al, 201093 | All heterosexual couples who had an ongoing sexual relationship over the preceding 6 months, were serodiscordant for HIV, and returned for at least 1 followup visit | Non-index partner with previous HIV diagnosis or known risk exposures other than relationship with index partner | 648 eligible; 602 serodiscordant at first visit; 625 analyzed (first visit data); 424 with followup | Detectable viral load in 111/120 (93%) not taking ART vs. 30/145 (21%) taking ART (p<0.001) | Not reported |
| Diamond et al, 200594 | Patients enrolled in trial of clinic-based safer sex interventions at 6 public HIV clinics, ages ≥18 years, HIV infection diagnosed for at least 3 months, sexually active during past 3 months, English or Spanish speaking, and expecting to continue care at clinic for next year | Missing information on unprotected sex (n=1), women who had sex with women only (n=11) | 2027 approached; 1840 screened; 1278 eligible; 886 enrolled (69% of patients screened and eligible); 874 analyzed | Not reported | Not reported |
| Elford et al, 200795; Elford et al, 2006100 | People ages ≥18 years diagnosed with HIV infection and receiving treatment and care in 6 East London public hospitals. Ineligible = limited command of English, too ill or too distressed to complete questionnaire | Bisexual women, lesbians; analysis included only gay or bisexual men, black African heterosexual men and women (87%  of respondents), other groups excluded due to small sample size | 2680 screened; 2299 eligible; 1687 completed questionnaire (gay men, n=758; black African heterosexual men, n=224; black African heterosexual women, n=480; response rate, 73% eligible attenders) | Not reported | Not reported |
| Miguez-Burbano et al, 200296 | RCT enrolled HIV-1 infected drug abusers at University of Miami clinic | Not reported | 87 screened; 85 enrolled, participated | Among those on ART, men were 7 times less likely to achieve positive virological response (undetectable viral loads after 6 months of treatment) compared with HIV-infected women (95% CI, 1–12.4; p=0.03). No gender differences in viral load for those not on ART | Not reported |
| Morin et al, 200797 | HIV-infected status, receipt of primary care at clinic, ages ≥18 years, ability to provide informed consent. | Transgendered individuals | # screened not reported; # eligible not reported; 4016 enrolled: n=2109 (52.5%) MSM; n=1104 (27.5%) women; n=803 (20.0%) MSW | Not reported | Not reported |
| Smit et al, 200698; van Haastrecht et al, 1991101 | HIV-positive homosexual drug users  Treatment: use of ART regimen, including a combination of ≥2 antiretrovirals with ≥1 protease inhibitor or nonnucleoside reverse transcriptase inhibitor | Not reported | 202 screened; 68 eligible; 67 enrolled on ART, 130 not on ART | During first 1.5 months after ART initiation, strong decline seen in HIV RNA levels among IDUs on ART and homosexual men on ART. Differed significantly from IDUs not on ART. After 1.5 months, decrease in HIV RNA was not significant in either ART group and increased nonsignicantly in IDUs on ART. | In first 3 months after therapy initiation, CD4 cell counts increased significantly in both ART- treated IDUs and homo-sexual men. After 3 months, CD4 cell counts continued to increase significantly among ART-treated homosexual men, remained stable among IDUs. CD4 cell counts contin-ued to decrease significantly among IDUs not on ART but slope differences compared with IDUs on ART were insignificant. |
| Tun et al, 200499; Vlahov et al, 1991102; Vlahov et al, 2001103 | ALIVE cohort participants had to be ages >18 years, report history of illicit drug injection within previous 11 years, and be AIDS-free at time of enrollment  Present analysis: Initiated ART between July 1996 and November 2000, had CD4 count obtained at visit immediately prior to ART initiation, had at ≥1 semiannual visit after ART initiation | Present analysis included those starting ART between July 1996 and November 2000 with CD4 count data for visit prior to ART inititiation and 1 visit after ART initiation, others excluded | 3360 enrolled in cohort; 693 HIV-positive enrolled 1996–2000; 276 initiated ART during study period; 190 analyzed | Not reported | Not reported |

| **Author, year** | **Adjusted variables  for statistical analysis** | **Outcomes** | **Adverse events** | **Funding source and role** | **Quality rating** |
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| Del Romero et al, 201093 | No adjustments | Proportion engaging in unprotected sexual intercourse in past 6 months, no ART vs. ART  273/476 (57%) vs. 69/149 (46%); p=0.019 Proportion of couples with previous pregnancies, no ART vs. ART  226/476 (47%) vs. 53/149 (36%); p=0.011 Characteristics of couples and events during followup based on ART of index partner, no treatment vs. mono/dual therapy vs. combined treatment Couples with unprotected sexual contacts: n=187 (55%) vs. n=24 (51%) vs. n=101 (70%) Couples with unprotected penile-anal contacts: n=13 vs. n=4 vs. n=11 Estimated number of risky sexual exposures: 11,000 vs. 1600 vs. 7400 \*\*Sexual risk exposures include penile-vaginal or penile-anal contacts without a condom and condoms breaking or slipping during intercourse | Not reported | Grant from FIPSE (foundation formed by Spanish Ministry of Health and Consumer Affairs and multiple pharmaceutical companies), and Spanish Network for Research on AIDS | Fair |
| Diamond et al, 200594 | Age, sex, race, HIV exposure category, years since HIV diagnosis, current CD4 count, number of sex partners in past 3 months, type of sex partners in past 3 months, use of illicit drugs or alcohol in past 3 months, depression and health beliefs, clinical site, frequency of missed appointments, duration of clinic attendance | Unprotected anal or vaginal sex: anal or vaginal intercourse without a condom within past 3 months.  Amphetamine use variable included any route, including injection.  Proportion engaging in unprotected sexual intercourse, ART vs. no ART 215/689 (31%) vs. 86/185 (46%); OR, 0.5 (95% CI, 0.4–0.7), p<0.001 Proportion engaging in unprotected sexual intercourse with ART adherence data, >95% ART adherence vs. <95% ART adherence  142/683 (28%) vs. 72/175 (41%); OR, 0.6 (95% CI, 0.4–0.8); p<0.001 Stratified analysis results: ART was significantly associated with decreased unprotected anal and vaginal intercourse across ages and sexes in whites, Latinos, MSM, and injection drug users, those diagnosed with HIV for <4 or >8 years, those with CD4 counts >200 x 109 cells/L, those with detectable viral loads, 1 sexual partner in past 3 months, main and casual sex partners in past 3 months, no use of marijuana, amphetamines, or nitrates (OR and CI available for these associations, more variables described in Table 3) \*\*Among those with exchange partners, unprotected intercourse was higher in those on ART than not on ART, only such group but nonsignificant result Multivariate analysis: negative relationship between ART use and unprotected intercourse remained after adjusting for race/ethnicity, marijuana use, alcohol use, symptomatic depression, clinic site, duration of clinic attendance (adjusted OR, 0.70 [95% CI, 0.50–1.0] p<0.04) | Not reported | Supported by National Institute of Mental Health grant, California Collaborative Treatment Group funded by universitywide AIDS research program of State of California, CDC, NCI grant | Fair |
| Elford et al, 200795; Elford et al, 2006100 | Age, number of years since diagnosis, CD4 count, employment, education, relationship, ART use, viral load, recreational drug use, seeking sex through Internet, HIV optimism (no significant differences found between black African heterosexual men and women on any sexual behavior outcomes [p>0.3], so combined for analysis) | Alpha=0.01.  Unprotected intercourse: vaginal or anal intercourse without a condom in previous 3 months.  In multivariate analysis, no significant association found between being on ART and unprotected intercourse with a casual partner of unknown or negative HIV status among gay men (p>0.01); in multivariate model, no variables other than seeking sex through Internet and recreational drug use were associated with unprotected intercourse with a casual partner who was HIV-positive among gay men (p>0.1); in multivariate analysis, no variables associated with unprotected intercourse with main partner of unknown or negative HIV status among gay men (p>0.1); in multivariate analysis there was no significant association between any variables and unprotected intercourse with main partner who was HIV-positive, -negative, or unknown for African men and women (p>0.05); abstract: neither viral load nor being on ART were significantly associated with unprotected intercourse among gay men or black African heterosexual men and women (p>0.05) | Not reported | Sponsorship: St. Bartholomew’s and the Royal London Charitable Foundation Research Advisory Board, City University London, Institute of Health Sciences, St. Bartholomew School of Nursing and Midwifery | Fair |
| Miguez-Burbano et al, 200296 | Unclear; states that multivariate analysis was performed but no details | Risk-taking behavior and HIV treatment Contaminated needles used by 18 participants; 85% of this group was receiving ART Men receiving ART tended to have unprotected anal sex compared with those not on ART; OR, 2 (95% CI, 0.47–11.73; p=0.067) | Not reported | NIDA, NIH-Fogarty | Fair |
| Morin et al, 200797 | For transmission risk acts: sexual identity, education, age, employment, alcohol use, stimulant use, ART use, race Results separated by sex (CD4 count and viral load were not associated with risk in univariate analysis, so not used in multivariate) | Sexual behavior over 6-month period  Unprotected sex: any act of insertive or receptive anal or vaginal intercourse in which a participant did not use a condom  Predictors of transmission risk sex, ART vs. no ART  MSM: transmission rate, 19% vs. 28%; adjusted OR, 0.73 (95% CI, 0.54–1.00); p=0.05  Women: transmission rate, 14% vs. 21%; adjusted OR, 0.75 (95% CI, 0.49–1.16); p=0.19  MSW: transmission rate, 10% vs. 12%; adjusted OR, 0.81 (95% CI, 0.39–1.67); p=0.56 | Mathematical modeling analyses among 4016 participants with HIV: total infections, 36.6; mean infections per participant, 0.009; infections per sexually active participant, 0.012 | Health Resources and Services Administration Special Projects of National Significance Program grant | Fair |
| Smit et al, 200698; van Haastrecht et al, 1991101 | No adjustments | At reference visit, 42% of ART users had injected drugs since previous visit, declining to 30% by third visit. At reference visit, 61% of nonART users had injected drugs since previous visit, declining to 44% by third visit. The proportion of IDUs that reported injecting drugs was significantly lower among ART users than nonART users at all visits (p<0.05), except the last 2. Modelled piecewise, ART users and nonART users showed nonsignificant declines in injecting drugs over time, which did not change after ART initiation. At reference visit, 15% of ART users and 13% of nonART users had engaged in unprotected sex. Significant differences between ART users and nonusers were seen at every visit (p<0.05). ART users reported significantly more unprotected sex than nonART users at reference visit, visit prior, and visit after reference visit (p<0.05). Modelled piecewise, sexual risk behavior nonsignificantly increased before ART initiation (OR, 1.67 per year [95% CI, 0.98–2.83]; p=0.06), and changed after initiation, nonsignificantly (OR, 0.33 per year [95% CI, 0.10–1.08]; p=0.07). Sexual risk behavior did not change over time for nonART users. | Not reported | Netherlands Organization for Health Research and Development; Ministry of Health, Welfare, and Sport; and the Dutch AIDS Fund | Fair |
| Tun et al, 200499; Vlahov et al, 1991102; Vlahov et al, 2001103 | Change in CD4 count from baseline, baseline CD4 count at visit prior to ART initiation, AIDS diagnosis prior to ART initiation, engaging in relevant risk behavior in the year prior to ART initiation or year of ART initiation, age at ART initiation, biological sex. Some analyses adjusted for past behavior | Unprotected sexual intercourse: engaging in vaginal or anal sex without using a condom (assessed in preceeding 6 months of each semiannual visit). Proportion of participants who engaged in any sexual intercourse (66.3%– 71.6%), unprotected sex (22.9%–26.2%), any drug injection (52.7%–49.0%), and/or needle sharing (20%–26.3%) remained stable or increased slightly from before to after ART initiation, not significant (figure shows proportion who initiated, discontinued, or continued each behavior); at individual level, about 6%–11% discontinued any 1 of the behaviors and about 7%–14% initiated any 1 of the behaviors after starting ART, about 80% continued same behaviors before and after ART Unprotected sex: 26.3% had engaged in unprotected sex after ART initiation, 48% of whom had not engaged in unprotected sex in year prior to ART initiation Drug injection: after followup, 48.9% reported injecting drugs, 15.1% of whom had not injected drugs in year prior to ART initiation; 26.3% shared needles after ART, 52% of whom had not shared needles in year prior to ART | Not reported | National Institute on Drug Abuse grants and National Research Service Award from National Institute of Mental Hygiene | Fair |

ART = antiretroviral therapy; CDC = Centers for Disease Control and Prevention; CI = confidence interval; IDU = injection drug user; IQR = interquartile range; MSM = men who have sex with men; MSW = men who have sex with women; NCI = National Cancer Institute; NIDA = National Institute on Drug Abuse; NIH = National Institutes of Health; OR = odds ratio; RCT = randomized, controlled trial; SD = standard deviation.