

Estimating HIV Prevalence and Risk Behaviors of Transgender Persons in the United States: A Systematic Review

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Abstract Transgender populations in the United States have been impacted by the HIV/AIDS epidemic. This systematic review estimates the prevalence of HIV infection and risk behaviors of transgender persons. Comprehensive searches of the US-based HIV behavioral prevention literature identified 29 studies focusing on male-to-female (MTF) transgender women; five of these studies also reported data on female-to-male (FTM) transgender men. Using meta-analytic approaches, prevalence rates were estimated by synthesizing weighted means. Meta-analytic findings indicated that 27.7% (95% confidence interval [CI], 24.8–30.6%) of MTFs tested positive for HIV infection (four studies), while 11.8% (95% CI, 10.5–13.2%) of MTFs self-reported being HIV-seropositive (18 studies). Higher HIV infection rates were found among African-American MTFs regardless of assessment method (56.3% test result; 30.8% self-report). Large percentages of MTFs (range, 27–48%) reported engaging in risky behaviors (e.g., unprotected receptive anal intercourse, multiple casual partners, sex work). Prevalence rates of HIV and risk behaviors were low among FTMs. Contextual factors potentially related to increased HIV risk include mental health concerns,

physical abuse, social isolation, economic marginalization, and unmet transgender-specific healthcare needs. Additional research is needed to explain the causes of HIV risk behavior of transgender persons. These findings should be considered when developing and adapting prevention interventions for transgender populations.

Keywords Transgender persons · Male-to-female · Female-to-male · HIV prevalence · HIV risk behaviors

Introduction

In the US, HIV/AIDS continues to have a devastating impact on vulnerable and marginalized populations (Wolitski et al. 2006). Although no national surveillance data are currently available on the incidence or prevalence of HIV/AIDS within the US transgender population, data collected by local jurisdictions suggest disproportionately high rates of HIV infection among transgender persons. In 2002, the State of California began recording male-to-female (MTF) and female-to-male (FTM) as gender reporting options in publicly-funded HIV counseling and testing sites (California Department of Health Services 2005; HIV Epidemiology Program 2006). Despite accounting for a small proportion of the population, data collected in 2003 revealed that self-identified transgender clients had a much higher rate of HIV diagnoses (6.3%) than other risk categories, including men who have sex with men (MSM; 4.2%) or partners of people living with HIV (4.8%) (California Department of Health Services 2006). These data also revealed that African American transgender clients had a substantially higher rate of HIV diagnoses (28.6%) than all other racial or ethnic groups (California Department of Health Services 2006). In 2006, the

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estimated prevalence of HIV among non-injecting MTFs living in San Francisco was 22.8%, a rate comparable to that estimated for MSM (24.3%) (San Francisco Department of Public Health 2006). Several HIV seroprevalence studies conducted in Europe and Asia also report high rates of HIV infection among MTF transgender persons (Pisani et al. 2004; Setia et al. 2006; Spizzichino et al. 2001; Wiessing et al. 1999; Zehender et al. 2004). Together, these data suggest that transgender populations, particularly MTFs, appear to be greatly impacted by the HIV epidemic.

The term “transgender” is an umbrella term that includes persons whose gender identity, expression, or behavior does not conform to societal gender norms associated with sex at birth (Center for AIDS Prevention Studies 2001). Transgender people experience a gender identity that is different than their anatomic sex; they may seek to alter their physical appearance by undergoing cosmetic procedures, using hormones, or having sex reassignment surgery. Other persons do not choose a physical transition, but rather express their gender identity through varied presentations and behaviors (Lombardi and van Servellen 2000b). Different labels have been used to describe gender-variant persons, including MTF, FTM, transsexual, cross-dresser, transvestite, drag queen/king, gender queer, and others (Keatley 2006).

Over the past decade, a small but growing literature has documented behaviors of transgender persons that can ultimately lead to the acquisition or transmission of sexually transmitted diseases (STDs), including HIV (Bockting and Avery 2005; Winningham and Seal 2003; Xavier et al. 2004). Transgender persons often engage in numerous risky sex behaviors, such as having multiple sex partners or unprotected sex, frequently within the context of commercial sex work (Shankle 2006). Needle injection practices may also increase risk for HIV through unsafe injection of recreational drugs or substances to alter gender presentation (i.e., hormones and silicone) (Bockting and Kirk 2001; Lombardi and van Servellen 2000a; Shankle 2006). Since no effective evidence-based HIV prevention interventions have been identified for transgender persons (Centers for Disease Control and Prevention [CDC] 1999; Lyles et al. 2007), there remains an urgent need to better understand both sex and injection risk behaviors, and the contextual factors underlying these risk behaviors. Once understood, these factors can be used to inform the development of new interventions or the adaptation of existing evidence-based interventions to meet the unique HIV prevention needs of transgender populations (McKleroy et al. 2006; Solomon et al. 2006).

This paper presents a systematic review of the US-based HIV behavioral prevention literature focusing on transgender populations. The goals of this paper are to use meta-analytic techniques to estimate the prevalence of HIV

infection among MTF and FTM transgender persons and to estimate the prevalence of HIV risk behaviors. This paper also seeks to identify individual, interpersonal, and structural/societal factors that may lead transgender persons to engage in behaviors related to increased risk of HIV transmission or acquisition.

Methods

Literature Search and Study Selection

Six search strategies were implemented to systematically identify reports providing HIV prevalence and incidence rates, percentage of transgender persons engaging in various HIV-related risk behaviors, or contextual factors associated with risky behavior. First, we searched the Centers for Disease Control and Prevention’s (CDC) HIV/AIDS Prevention Research Synthesis (PRS) project cumulative database of the HIV/AIDS and STD behavioral prevention research literature (Lyles et al. 2006). The PRS database was developed using a comprehensive search of five electronic bibliographic databases, including AIDS-LINE (1988–2000), EMBASE, MEDLINE, PsycINFO, and Sociological Abstracts from 1988 through 2006. The search cross-referenced standardized search terms in three key domains: (a) HIV, AIDS, or STD; (b) prevention, intervention, evaluation, education; and (c) behavioral or biologic outcomes (e.g., sex behavior, needle sharing, incident STD or HIV). Citations that intersect all three domains were downloaded into the PRS database. The full search strategy developed for each electronic database is available from the authors, and the search is performed annually. The PRS database was queried to locate relevant reports by searching the titles, abstracts, and key words of citations using terms such as “transgender,” “transsexual,” “transvestite,” “cross-dresser,” “MTF,” and “FTM.”

Second, a search of these five databases was repeated to fill indexing gaps through January 2007, and the CINAHL and Science Citation Index databases were searched to identify additional published studies focused on transgender populations. Third, a hand search of over 35 key journals published between June 2006 and January 2007 was conducted using the same domains as the automated search. Fourth, searches were conducted on published conference abstracts from national and international HIV/AIDS and STD conferences. Fifth, principal investigators were identified and contacted to obtain recommendations of current and ongoing research, additional published and unpublished reports, and other in-press publications. Finally, the reference lists of all pertinent reports were reviewed to identify additional citations. The combination of these search strategies yielded 307 reports.

Next, the 307 reports were examined to identify studies for inclusion in this review. Studies were considered for inclusion if they described a US-based study (i.e., behavioral survey, needs assessment, intervention evaluation, or seroprevalence study) targeting transgender persons (i.e., MTF, FTM, transsexuals, transvestites or cross-dressers), or a study that included transgender persons with other target populations and reported data separately for the transgender group. Studies were included if data were reported on one or more of the following variables: incidence/prevalence of HIV (self-reports, HIV testing results), incidence/prevalence of other STDs (self-reports, test results), sex risk behaviors (e.g., condom use, number and type of partners, sex while high or drunk, sex work), or drug risk behaviors (e.g., injection of recreational drugs, hormones, or silicone; needle sharing).

Data Abstraction of Study and Participant Characteristics

Linkages among reports were identified to ensure that multiple articles describing the same study were included in the coding and data analysis as one study. Pairs of trained reviewers abstracted information from included studies. Each study was coded for the following information using a standardized coding form: study dates, location, sampling method, recruitment setting, study eligibility criteria, sample size, and method of data collection (i.e., self-administered vs. interviewer-administered survey). Participant characteristics were also coded including demographics such as age, race/ethnicity, sex at birth, gender identification, education, income, employment status, housing status; HIV serostatus (i.e., self-report or test result); history of prior STDs; sex risk behaviors including number of partners, type of partners (main, casual, or sex work), unprotected anal intercourse (receptive or insertive), and sex work; and drug risk behaviors including injection drug use (street, hormones, silicone), needle sharing, and non-injecting drug use. The abstraction of sex and drug risk behaviors was guided by established coding strategies used for the CDC PRS Project (Lyles et al. 2006).

Data were also abstracted on contextual factors that are presumed to increase HIV risk behavior. No prior study has synthesized the contextual factors associated with HIV risk in transgender persons; therefore, the authors identified the following factors across studies: mental health/psychiatric issues (e.g., suicidal ideation, alcohol or substance use, counseling or psychiatric treatment), history of abuse (e.g., physical abuse, forced sex), social isolation (e.g., lack of social support, interactions with the community), economic marginalization (e.g., job discrimination, lack of financial resources), incarceration history, health care needs (e.g.,

access to general and transgender-specific health care), and misperceptions of HIV/AIDS risk. Reports of associations between these contextual factors and HIV serostatus were also identified. All coding discrepancies were reconciled through discussion.

Analytic Approach

The meta-analytic methods used are described in Lipsey and Wilson (2001, p. 39). We estimated prevalence rates (i.e., weighted mean percentages) and calculated 95% confidence intervals (CI) for the following outcomes: being HIV-seropositive, treatment for a previously diagnosed STD, reporting sex or drug risk behaviors, or reporting contextual factors related to HIV risk. In brief, the proportion of cases reporting each outcome in a study was multiplied by its corresponding weight (i.e., inverse variance) to compute a weighted percentage. The weighted percentages were summed across all studies. The sum of the weighted percentages was then divided by the sum of the weights to calculate the weighted mean percentage. Meta-analyses were conducted only when three or more studies reported a particular outcome, and prevalence rates were calculated separately for MTF and FTM transgender persons. Sensitivity analyses examined the effect of outliers by comparing the weighted mean percentage with estimates obtained after iterations using $k-1$ findings, where k equals the number of independent studies. In other words, we removed a finding and re-calculated the estimated weighted mean percentage. We then replaced that finding, removed another, and repeated the process.

Results

Description of Reviewed Studies

A total of 29 studies met the review inclusion criteria (Table 1). Studies were conducted between 1990 and 2003, with the majority (55%) taking place between 1996 and 1999. Study locations included 10 states plus Puerto Rico and the District of Columbia; San Francisco was the most common study location (nine studies; 31%). Studies collected data through face-to-face interviews (59%), self-administered surveys (24%), or focus groups (17%). Study participants were predominantly convenience samples (79%) recruited from venues that served transgender persons, including community-based organizations and service providers, and social settings such as bars, neighborhoods, and social networks. Thirteen studies (45%) provided a definition or specific eligibility criteria used to recruit and enroll transgender participants.

Table 1 Description of 29 US-based studies of transgender persons

Source	Study dates	Location	Data collection	Sampling	Eligibility criteria	TG sample	N	Mean age (range)	% Race/ethnicity			% HIV+ (method)	
									White	AA	Hisp		Other ^a
Bockting et al. (1998)	NR	Minneapolis/St. Paul	Focus group ^b	Convenience	Crossdressers, TG sex workers, & individuals from spectrum of TG and TS identity	89% MTF 11% FTM	19	40.2 (20–61)	79	11	5	5	21 (SR)
Bockting et al. (2005)	1997–2002	Minnesota	Self-administer ^b	Convenience	Self-identified TG persons	77% MTF 23% FTM	207	40.8 (NR)	92	0	0	8	.5 (SR)
Clements-Nolle et al. (2001b)	1996	San Francisco	Focus group	Convenience	Self-identified TG persons	82% MTF 12% FTM	100	34.7 (18–66)	37	15	24	24	NR
Clements-Nolle et al. (2001a)	1997	San Francisco	Interview	Respondent driven sampling	Primary gender TG, TS, bigender, TV, crossdresser, intersexed, or opposite sex of that at birth	76% MTF ^f 24% FTM	392	34 (18–67)	27	27	27	19	35 (Test)
Conare et al. (1997)	1997	Philadelphia	Interview	Convenience (snowball)	Self-identified TG persons ^d	56% MTF ^f	39	28.4 (NR)	3	85	0	12	18 (SR)
Elifson et al. (1993) and Boles and Elifson (1994)	1990–1991	Atlanta	Interview	Social mapping, snowball, chain-referral	TV prostitutes	44% FTM 100% MTF	31 53	26.4 (19–57) 25 (17–43)	0 17	62 83	10 0	28 0	0 (SR) 68 (Test)
Garofalo et al. (2006)	2003	Chicago	Self-administer	Convenience	Self-identified ethnic minority MTF TG youth	100% MTF	51	22 (16–25)	0	57	16	27	22 (SR)
Kammerer et al. (2001)	1995	Boston	Focus group	NR	TG persons	<100% MTF	NR	NR (teen–60s)	NR	NR	NR	NR	NR
Kellogg et al. (2001)	1997–2000	San Francisco	Medical charts	HIV testing records	Self-identified MTF TG persons	100% MTF	238	33 (19–66)	29	25	29	17	16 (Test)
Kenagy (2002, 2005a)	1997	Philadelphia	Interview	Convenience (snowball)	Self-identified TG persons ^d	60% MTF ^f 40% FTM	49 32	29 (NR) 26 (NR)	11 13	73 60	0 0	16 27	19 (SR) 0 (SR)

Table 1 continued

Source	Study dates	Location	Data collection	Sampling	Eligibility criteria	TG sample	N	Mean age (range)	% Race/ethnicity				% HIV+ (method)
									White	AA	Hisp	Other ^a	
Kenagy (2005b) and Kenagy and Hsieh (2005)	1997	Philadelphia	Interview	Convenience (snowball)	Self-identified gender identity including MTF TS, transwoman, TV, drag queen, cross-dresser, female, TG, transgenderist	62% MTF 38% FTM	182	32 (17–68)	33	41	6	20	6 (SR)
Kenagy and Bostwick (2005) and Kenagy and Hsieh (2005)	2000–2001	Chicago	Interview	Convenience (snowball)	Self-identified TG persons ^d	70% MTF ^f	78	38 (NR)	32	42	0	26	21 (SR)
Lombardi et al. (2001) and Wilchins et al. (1997)	1996–1997	New York City	Self-administer	Convenience	TG persons	30% FTM 53% MTF 40% FTM	33 402	27 (NR) NR	70 71	9 4	0 2	21 23	0 (SR) NR
McGowan (1999)	1999	New York City	Interview	Convenience	TG persons	86% MTF 12% FTM	94	NR	54	19	22	5	22 (SR)
Melendez et al. (2005)	NR	Los Angeles, San Francisco, New York, Milwaukee	Interview	Convenience	Self-identified HIV+ MTF TG persons	100% MTF	59	39 (NR)	9	66	15	10	100 ^c (Test)
Nemoto et al. (1999)	1996	San Francisco	Interview	Convenience	TG gender identification	100% MTF	25	37 (NR)	17	44	30	9	48 (SR)
Nemoto et al. (2004a, 2006)	1999–2000	San Francisco	Focus group	Venue-based	Self-identified MTF TG person of color (including pre- and post-operative status)	100% MTF	48	35 (19–55)	0	33	25	42	26 (SR)

Table 1 continued

Source	Study dates	Location	Data collection	Sampling	Eligibility criteria	TG sample	N	Mean age (range)	% Race/ethnicity			% HIV+ (method)	
									White	AA	Hisp		Other ^a
Nemoto et al. (2004b, 2005), Operario and Nemoto (2005) and Sugano et al. (2006)	2000–2001	San Francisco	Interview ^b	Venue-based	Self-identified MTF TG person of color (including pre- and post-operative status)	100% MTF	332	34 (18–60)	0	33	33	34	26 (SR)
Odo et al. (2001)	1998–2000	O'ahu, Hawaii	Interview	Convenience	Native Hawaiian MTF TG persons	100% MTF	100	NR (12–46)	0	0	0	100	3 (SR)
Reback et al. (2001)	1996–1997	Los Angeles	Interview	Convenience	MTF TG or TS persons including those at different stages of social role transition from man to woman	100% MTF	209	31 (NR)	28	22	40	10	NR
Reback et al. (2004, 2005) and Simon et al. (2000)	1998–1999	Los Angeles	Interview	Convenience	Self-identified MTF TG or TS or identified as a woman who was born male	100% MTF	244	30 (18–61)	15	7	49	29	22 (Test)
Risser et al. (2005)	2002–2003	Houston	Self-administer	Convenience	TG persons	100% MTF	67	35 (18–45)	46	30	19	5	27 (SR)
Rodriguez-Madera and Toro-Alfonso (2005)	NR	San Juan	Interview	Convenience	TG persons	92% MTF 8% andro	50	27 (NR)	0	0	100	0	14 (SR)
Rose et al. (2003)	NR	San Francisco & Alameda County	Focus group & interview	Convenience	African American TG persons	100% MTF	71	37 (19–57)	0	100	0	0	60 (SR)

Table 1 continued

Source	Study dates	Location	Data collection	Sampling	Eligibility criteria	TG sample	N	Mean age (range)	% Race/ethnicity				% HIV+ (method)
									White	AA	Hisp	Other ^a	
Singer et al. (1997)	1996–1997	Philadelphia	Self-administer	Convenience	TG persons including MTF, TS, FTM, TS, TG assigned female, TG assigned male, and cross-dressers	66% MTF 34% FTM	103	36 (17–68)	53	24	7	16	4 (SR)
Stephens et al. (1999)	NR	West Coast	Self-administer	Convenience	Self-identified TS inmate	100% MTF	31	33 (NR)	19	55	16	10	NR
Sykes (1999) and Sykes and Truax (1999)	NR	Northern California	Interview	Convenience (snowball)	Self-identified TG persons	84% MTF 16% FTM	232	32 (NR)	30	14	12	44	20 (SR)
Weinberg et al. (1999)	1990–1991	San Francisco	Interview	Convenience	TG sex workers	100% MTF	45	45	45	0	0	55	NR
Xavier et al. (2005)	1999–2000	District of Columbia	Self-administer	Convenience (snowball)	Visibly TG variant persons ^e	76% MTF ^f	188	27 (13–59)	2	68	28	2	32 (SR)
						24% FTM	60	26 (13–61)	12	75	1	12	3 (SR)

Note: AA indicates African American; andro, androgynous; FTM, female-to-male transgender; Hisp, Hispanic; MTF, male-to-female transgender; NR, not reported; SR, self-report; TG, transgender; TS, transsexual; TV, transvestite

^a Category includes Asian, Native American, biracial and multiracial individuals

^b Study reports an evaluation of an HIV prevention intervention

^c Based on inclusion criteria for Healthy Living Project clinical trial

^d Participants self-identified as TG by answering “yes” to the following: “According to one definition, being transgendered is the recognition of conflict between gender at birth and present gender identity. According to this definition, do you consider yourself to be transgendered?”

^e Including those “who live or want to live full-time in a gender opposite their birth or physical sex, those who have or want to physically modify their bodies to match their internal gender identity, and those who wear the clothing of the opposite sex in order to fully express an inner, cross-gender identity” (Xavier et al. 2005, p. 33)

^f Study reported data separately for MTF and FTM

Study sample sizes ranged from 19 to 515, with nearly half (48%) having samples fewer than 100 participants. The average age across studies was 34 years, the median educational attainment was 11.7 years, and 21 studies (72%) were comprised of predominantly non-white participants. Fifteen studies included combined samples of MTF and FTM transgender persons; with five of these studies also reporting separate data for these groups. The remaining 14 studies reported data on MTF transgender women exclusively. Three studies evaluated behavioral interventions for transgender populations (Bockting et al. 1999, 2005; Nemoto et al. 2005).

Estimated Prevalence and Incidence Rates of HIV Infection

HIV infection prevalence rates for MTFs were reported in 22 studies (Table 1). The average prevalence was 27.7% (range 16–68%) from the four studies that reported rates of laboratory-confirmed HIV infections among MTFs (Table 2). Further, African American MTFs (weighted mean, 56.3%) had higher rates of HIV infection than white MTFs (weighted mean, 16.7%) or Hispanic MTFs (weighted mean, 16.1%). When the results were averaged across the 18 studies where respondents self-reported their HIV serostatus, the weighted average was 11.8% (range, 3–60%). The rates of self-reported HIV infection across studies comprised predominantly of African American MTFs (weighted mean, 30.8%) were higher than rates reported in studies comprised mainly of white MTFs (weighted mean, 6.1%). A sensitivity analysis indicated that each weighted mean was affected less than $\pm 2\%$ when any single study was removed from the analysis.

Two studies reported incidence rates of new HIV infections for MTF transgender women. One study conducted in anonymous HIV testing sites in San Francisco reported that the incidence of new HIV infections among 238 MTF repeat testers was 7.8 infections per 100 person years—the highest rate reported for any risk group in that jurisdiction (Kellogg et al. 2001). A study conducted in Los Angeles reported that the rate of new HIV infections among 244 MTFs was 3.4 infections per 100 person years (Simon et al. 2000). Consistent with the prevalence data, both studies reported substantially higher rates of new infections among African American and multi-racial MTFs than among other racial groups.

Five studies reported HIV prevalence rates for FTM transgender men (see Table 1). In four studies where respondents self-reported their HIV serostatus, prevalence rates ranged from 0% (in three studies) to 3% (in one study). The only study providing HIV tests to FTMs reported a 2% prevalence rate of HIV infection (Clements-

Nolle et al. 2001a). HIV incidence rates for FTMs have not been reported in the literature.

Estimated Prevalence of Prior STDs

Averaging across the 10 studies reporting data on STD history, 21.1% of MTFs reported having a prior STD infection (Table 2). Higher rates of self-reported STDs were found in two studies comprised predominantly of white MTFs (36% and 79%) than in studies comprised mainly of racial or ethnic minorities (range 12–42%; weighted mean, 16.9%; 95% CI, 14.3–19.4%; $k = 8$). Two studies (Conare et al. 1997; Kenagy 2002) with predominantly minority FTMs reported low rates of prior STDs (6% and 7%, respectively).

Estimated Prevalence of HIV Risk Behaviors

MTFs

Rates of risky sex behaviors were reported in 29 studies (Table 2). Across studies, 31.7% of MTFs reported having multiple sex partners who were predominantly male, and 48.3% reported having sex with casual partners. Fewer MTFs reported having sex with partners who were injection drug users (weighted mean, 24.3%) or HIV-seropositive (weighted mean, 8.5%). The averaged rate of any unprotected receptive anal intercourse [URAI] was 44.1%, and the highest rates of URAI were reported with sex work clients (weighted mean, 38.5%) or main partners (weighted mean, 37.1%). The rate of URAI with casual partners was somewhat lower (weighted mean, 26.7%). An estimated 27.4% of MTFs reported unprotected insertive anal intercourse (UIAI) (six studies), and 39.3% reported sex while drunk or high (nine studies). Seventeen studies reported data concerning the percentage of MTFs who participated in sex work, with rates ranging from 24 to 75% (weighted mean, 41.5%).

Across studies, MTFs reported comparable rates of injecting hormones (weighted mean, 27.0%) or silicone (weighted mean, 24.7%), and a much lower rate of injecting street drugs like heroin or crack (weighted mean, 12.0%). Nine studies reported low rates of sharing needles when injecting street drugs (weighted mean, 2.0%), or when injecting hormones or silicone (weighted mean, 6.0%). In terms of non-injection substance use, sizeable percentages of MTFs reported consuming alcohol (weighted mean, 43.7%), using crack or other illicit drugs (weighted mean, 26.7%), or smoking marijuana (weighted mean, 20.2%). The recall periods of the above-mentioned HIV risk behaviors varied across studies, with a range from

Table 2 Estimated prevalence rates of HIV infection, prior STDs, and HIV risk behaviors among male-to-female (MTF) transgender persons (29 studies)

	Number of studies (<i>k</i>)	Weighted mean (%)	95% confidence interval (CI) (%)	Range (%)
HIV infection				
Test results	4	27.7	24.8–30.6	16–68
African American	4	56.3	50.1–62.4	33–75
Hispanic	3	16.1	12.1–20.1	6–29
White	4	16.7	11.8–21.5	11–33
Self-reports	18	11.8	10.5–13.2	3–60
>50% African American	5	30.8	26.5–35.1	18–60
>50% White	4	6.1	3.9–8.3	4–22
Prior STD diagnosis	10	21.1	18.7–23.5	12–79
HIV risk behaviors				
Sex partners				
Multiple (2 or more)	10	31.7	29.4–33.9	10–62
Casual	15	48.3	46.3–50.3	25–89
HIV positive	7	8.5	6.8–10.2	5–33
Injection drug user	4	24.3	19.5–29.1	21–28
Sex behaviors				
Any URAI ^b	12	44.1	42.0–46.2	11–77
URAI with main partner	7	37.1	34.4–39.8	22–47
URAI with casual partner	6	26.7	24.1–29.2	13–37
URAI with sex work clients	7	38.5	36.1–40.8	12–77
Any UIAI	6	27.4	24.6–30.2	9–54
Sex while drunk or high	9	39.3	36.6–41.9	9–77
Sex work ^a	17	41.5	39.5–43.6	24–75
Drug injection behaviors				
Street drugs	16	12.0	10.4–13.5	3–44
Hormones	8	27.0	25.0–29.0	6–90
Silicone	9	24.7	22.6–26.8	4–93
Needle sharing—street drugs	9	2.0	1.3–2.7	1–21
Needle sharing—hormones or silicone	6	6.0	5.1–6.8	4–9
Other drug use				
Crack or other illicit drug	13	26.7	24.5–29.0	11–71
Alcohol	11	43.7	41.3–46.1	9–77
Marijuana	8	20.2	17.7–22.8	13–71

Note: STD, sexually transmitted diseases; UIAI, unprotected insertive anal intercourse; URAI, unprotected receptive anal intercourse

^a Excluded 1 study (Elifson et al. 1993) with sex work as an eligibility criteria

^b If a study reported multiple URAI outcomes, each was abstracted separately

1 month to as long as 1 year (median, 3 months). A sensitivity analysis indicated that each of these weighted means was affected less than $\pm 4\%$ when any single study was removed from the analysis.

FTMs

While five studies reported HIV risk behaviors of FTMs, those data were not included in a meta-analysis because of the limited number of findings. Two studies (Conare et al.

1997; Kenagy 2002) reported that a vast majority of FTMs engaged in at least one high-risk sex behavior in the prior 3 months (90.6% and 93.3%); however, neither study specified the nature of the behaviors. In a study of 123 FTMs (Clements-Nolle et al. 2001a), 66% reported that they either abstained from sex or only had one sex partner, 34% reported having two or more partners during the prior 6 months, and 31% reported engaging in sex work. One study (Conare et al. 1997) reported a small percentage of FTMs engaging in unprotected vaginal or anal intercourse (6.5% and 4.1%, respectively), while another study (Xavier et al. 2005)

reported a higher percentage of unprotected “genital-genital contact” (22%). Two studies (Kenagy 2002; Xavier et al. 2005) did not find FTMs engaging in injection drug use, while the remaining three studies (Clements-Nolle et al. 2001a; Conare et al. 1997; Kenagy and Bostwick 2005) reported rates of non-hormonal injection ranging from 4 to 21%. Although reported rates of syringe sharing and use of hormones by FTMs were low (0–12%) (Conare et al. 1997; Kenagy 2002; Xavier et al. 2005), another study (Clements-Nolle et al. 2001a) reported that 53% of 123 FTMs used hormones during the prior 6 months.

Estimated Prevalence of Contextual Factors Potentially Associated with HIV Risk

Studies were also reviewed to estimate the prevalence of contextual factors that may be related to the HIV risk behaviors of transgender persons (see Table 3). The factors

uncovered in this review include mental health issues, physical abuse, social isolation, economic marginalization, incarceration, health care needs, and misperceptions of HIV/AIDS risk.

Mental Health Issues

MTFs in particular reported high rates of suicidal thoughts (weighted mean, 53.8%) or lifetime suicide attempts (weighted mean, 31.4%). Across studies, transgender respondents indicated a desire for mental health counseling or psychiatric services (weighted mean, 43.9%) to address transgender-related issues such as gender transition. Many persons who reported receiving prior mental health services also indicated difficulties in finding an appropriate therapist (Singer et al. 1997) or being refused treatment due to their gender identity (Conare et al. 1997). Problems with alcohol and other substances were reported in five studies (weighted mean, 13.7%).

Table 3 Estimated prevalence rates of contextual factors that are potentially related to HIV risk

	Number of studies (<i>k</i>)	Weighted mean (%)	95% confidence interval (CI) (%)	Range
Mental health issues				
Suicidal thoughts ^a	5	53.8	49.7–57.8	47–64
Prior suicide attempts	6	31.4	28.3–34.5	27–39
Desire mental health counseling	5	43.9	40.0–47.7	24–60
Problems with alcohol or other substances	5	13.7	11.2–16.3	5–32
Abuse				
Physical abuse	5	42.9	38.9–46.9	20–69
Forced sex or rape	4	20.6	16.9–24.3	12–72
Violence at home	3	57.9	51.8–63.1	50–72
Social isolation				
Discomfort in public settings	3	60.4	55.1–65.8	31–73
Feel unsafe in public settings	3	76.6	72.0–81.3	43–85
Economic marginalization				
Homelessness	11	12.9	11.4–14.4	5–47
Unemployment	13	23.0	21.3–24.6	6–74
Job discrimination	4	35.3	31.5–39.0	25–60
Social services discrimination	3	40.6	35.7–45.5	36–52
Incarceration history				
	7	32.8	30.1–35.4	7–81
Health care needs				
Without health insurance	7	49.9	47.2–52.6	20–68
Refused transgender-related medical care ^b	5	30.5	26.7–34.4	13–52
Obtain hormones from non-medical source	5	33.8	31.1–36.4	24–63
Misperceptions of HIV/AIDS risk				
Low or no chance of having HIV/AIDS ^c	5	71.6	67.4–75.8	59–88
Low or no chance of getting AIDS ^c	3	83.9	77.6–90.2	57–90

^a Based on five studies comprised mainly of MTF transgender persons; rates for FTM transgender persons reported in two studies were 29% (Conare et al. 1997) and 33% (Xavier et al. 2005)

^b Includes hormone or surgical treatment

^c Percentages reported for MTF transgender persons. Similar rates were reported for FTMs in two studies (Conare et al. 1997; Kenagy 2002)

Physical Abuse during Adulthood

A history of physical abuse (weighted mean, 42.9%) or forced sex (weighted mean, 20.6%) were reported by both MTFs and FTMs. According to one study (Xavier et al. 2005), the most common motives for violence included homophobia (43%) or gender-based discrimination or transphobia (35%). A sizeable proportion of MTFs also reported a history of violence in their home (weighted mean, 57.9%). Risser et al. (2005) reported a higher rate of violence attributed to primary partners (50%) than casual partners (22%).

Social Isolation

Three studies reported that transgender persons felt uncomfortable (weighted mean, 60.4%) or unsafe (weighted mean, 76.6%) in public settings. Social relationships were also impacted by a fear of rejection by partners or others (Bockting et al. 1998), limited familial support and social isolation (Bockting, et al. 2005; Rodriguez-Madera and Toro-Alfonso 2005; Garofalo et al. 2006; Nemoto et al. 2004a; Rose et al. 2003), and negative societal views of gender variant identities (Clements-Nolle et al. 2001a; Rose et al. 2003). A lack of connection to the gay, lesbian and bisexual community, and the lack of a cohesive transgender community may also contribute to impaired social relationships among transgender persons (Elifson et al. 1993; Garofalo et al. 2006; Bockting et al. 1998).

Economic Marginalization

Across studies, transgender respondents reported current discrimination in housing, employment, and access to social services. An estimated 12.9% reported being homeless (i.e., living on the street or transient housing). One study reported that transgender persons disproportionately represented homeless/runaway youth (Kammerer et al. 2001). Aggregating across studies, the rates of unemployment (23.0%), job discrimination (35.3%), and difficulty accessing social services (40.6%) were elevated. Transgender persons also expressed a need for legal services and job skills training to improve their economic situation (Kenagy 2002; Kenagy 2005b).

Incarceration History

Seven studies reported data on prior incarceration with rates ranging from 7 to 81% (weighted mean, 32.8%). Several studies indicated that a lack of employment opportunities can lead transgender persons to perform sex

work, which can lead to incarceration (Clements-Nolle et al. 2001b). Among young minority MTFs in one study (Garofalo et al. 2006), over 90% of those engaging in sex work had a history of incarceration or arrest.

Health Care Needs

Transgender respondents also reported inequities in health care. Seven studies reported that a substantial percentage of transgender persons were without health insurance (weighted mean, 49.9%). Although two studies reported that transgender respondents were able to obtain hormones from a physician or clinic (21% and 27%) (Xavier et al. 2005; Reback and Simon 2004), five studies reported sizeable proportions of transgender persons seeking non-medical sources for hormones (weighted mean, 33.8%). Studies also reported transgender persons being refused transgender-related medical care by providers (weighted mean, 30.5%) due to providers being insensitive to their transgender-specific healthcare needs (Clements-Nolle et al. 2001a; Garofalo et al. 2006; McGowan 1999; Xavier et al. 2005). Many transgender persons may be reluctant to join an HIV prevention program due to service provider insensitivity (Clements-Nolle et al. 2001b) or fear of being revealed as transgender (Xavier et al. 2005).

Misperceptions of HIV/AIDS Risk

Transgender persons underestimate their level of risk for HIV. While the majority of MTFs in seven studies (Conare et al. 1997; Kenagy 2002; McGowan 1999; Reback and Simon 2004; Rodriguez-Madera and Toro-Alfonso 2005; Singer et al. 1997; Sykes 1999) were considered to be at high risk for HIV according to their self-reported risk behaviors, most respondents did not believe they were at risk for having HIV/AIDS (weighted mean, 71.6%) or at risk for getting the AIDS virus in the future (weighted mean, 83.9%). In another study (Sykes 1999), only 15% of 232 transgender persons estimated their risk of acquiring HIV as “greater than most people.”

Contextual Factor Associations with HIV Serostatus and Risk Behavior

Two studies reported the association of contextual factors with HIV-positive status. Clements-Nolle et al. (2001a) examined the independent associations of demographic, risk behavior, and contextual variables with HIV prevalence among MTF transgender persons. While demographics (i.e., African American race and not having

a high school diploma) and risk behaviors (i.e., having over 200 lifetime sex partners and nonhormonal injection drug use) were identified as independent predictors of HIV-positive status, having a lifetime history of incarceration or forced sex or rape did not predict serostatus. Xavier et al. (2005) identified lack of employment and history of sexual assault as significant independent predictors of HIV-positive serostatus among a sample of 248 transgender persons. Only one study reported associations between contextual factors and HIV risk behaviors among subgroups of MTFs (Nemoto et al. 2004a). Exposure to transphobia (i.e., gender-based discrimination or stigma) resulted in a greater odds of engaging in URAI among young transgender women aged 18–25 years (Sugano et al. 2006), and self-reported depression and ever attempting suicide were associated with URAI among Asian and Pacific Islander transgender women (Operario and Nemoto 2005).

Discussion

This systematic review of US-based studies presents a comprehensive synthesis of the prevalence of HIV infection, other STDs, and risk behaviors of MTF and FTM transgender persons. Aggregating across studies, nearly 11.8% of MTFs self-reported that they were infected with the HIV virus, with substantially higher rates of infection reported in studies comprised chiefly of African Americans. An even higher estimate of HIV prevalence comes from the four studies that provided HIV tests to MTFs. According to these studies, 27.7% of MTFs had confirmed HIV infection, and higher rates were found among African American MTFs compared to white or Hispanic MTFs. It is alarming to note that the overall rate of HIV infection among MTFs in these four studies exceeded the 25% prevalence of HIV infection among MSM in five US cities (Sifakis et al. 2005). Furthermore, elevated rates among African American MTFs suggest that the dual stigma of being transgender and a racial minority may exacerbate HIV risk (Garofalo et al. 2006). The considerable discrepancy between self-reported HIV infections and actual test results may be due to MTFs not being aware of their serostatus (CDC 2004). Prevention programs need to encourage MTFs to routinely test for HIV at least annually, as recommended for MSM (Branson et al. 2006).

This review also found that MTFs reported high rates of previous STD diagnoses and numerous sex behaviors that have been linked to an increased risk of HIV transmission or acquisition. Most notably, MTFs reported elevated rates of having casual sex partners, engaging in unprotected receptive anal intercourse, participating in sex work, and combining sex with alcohol or other drugs. As indicated in the prior literature, MTFs reported higher rates of

unprotected receptive anal intercourse than insertive anal intercourse. It is likely that many MTFs seek to affirm their feminine gender identity and enhance sexual intimacy with their sex partners by engaging in risky receptive anal intercourse (Bockting et al. 1998). In addition, this review indicated that MTFs also engaged in high rates of unprotected receptive anal intercourse with sex work clients. Thus, there is a need for prevention programs to encourage transgender persons to practice safer sex behaviors within different types of relationships. While MTFs infrequently reported injection of street drugs and needle sharing, injection of hormones or silicone to alter gender presentation and use of alcohol and other illicit drugs during sex was common. These findings highlight the need for HIV prevention programs to also emphasize the reduction of risky substance use behaviors among MTFs (Bockting and Kirk 2001).

The prevalence of risky sex and drug behaviors among FTMs is less clear given the paucity of studies focusing on this group. Nevertheless, the five studies reporting data for FTMs revealed prevalence rates of HIV infection and HIV risk behaviors that were much lower than those reported by MTFs. Nonetheless, FTMs did report engaging in numerous HIV risk behaviors, including unprotected anal and vaginal intercourse, sex work, and drug use. Additional research is needed to elucidate the HIV risk behaviors of FTMs, including type of sex partners (e.g., males, transgender persons), level of participation in commercial sex work, and frequency of sharing drug and hormone injection equipment.

This review identified several individual-level (e.g., suicidal thoughts, need for mental health counseling, misperceptions of HIV risk), interpersonal (e.g., physical and sexual abuse, violence at home, discomfort in public settings), and structural/societal (e.g., discrimination in employment and social services, incarceration, transgender-specific health care needs) experiences that may be common among transgender populations and potentially related to increased risk of HIV (Dean et al. 2000). While the studies reported HIV-related risk behaviors and their prevalence among transgender persons, few directly tested how these contextual factors are specifically linked to HIV risk behaviors or to HIV serostatus. It may be the case that these factors interact with or amplify the vulnerability of transgender persons to engage in risky behavior. To better inform prevention efforts, future research should closely examine the syndemic or additive effects of these contextual factors with HIV risk (Stall et al. 2003), and develop integrative frameworks for addressing transgender HIV risk within a broader social context (Sumartojo 2000).

The findings of this meta-analytic review are constrained by the methodological limitations of the primary studies. The small number of studies in the literature

reporting rates of HIV infection and risk behaviors for FTM transgender men did not permit us to average findings using meta-analytic approaches. In addition, only one study (Garofalo et al. 2006) reported the HIV risk behaviors of young transgender persons, and none of the studies addressed HIV risk among gender variant persons who do not correspond to the MTF or FTM dichotomy. To ascertain accurate HIV prevalence estimates among MTF and FTM transgender persons, jurisdictions throughout the US should emulate the State of California and collect HIV testing data using expanded gender categories.

Another limitation involves the sampling methods used by most studies to identify and recruit potential participants (Dean et al. 2000). As the majority of studies sampled respondents using non-probability methods (e.g., convenience sampling and snowball sampling), persons who were either at high risk for HIV infection or engaged in risky behaviors may have been overrepresented. Thus, our findings may have overestimated the prevalence of HIV infection and risk behaviors of the transgender population. However, according to two studies that employed more rigorous sampling strategies to obtain broader and more representative samples of MTFs (Clements-Nolle et al. 2001a; Nemoto et al. 2004b), comparable rates of HIV infection and risk behaviors were reported. More rigorous recruitment strategies, such as time-space sampling or modified chain-referral methods like respondent-driven sampling (Lansky et al. 2007), have been successfully used when recruiting marginalized and hard-to-reach populations for HIV-related behavioral surveys (Abdul-Quader et al. 2006; Ramirez-Valles et al. 2005). We encourage future research to employ more rigorous methods to systematically monitor the HIV epidemic among US transgender populations.

In addition, over half of the included studies examined data collected through structured face-to-face interviews. Interviews are commonly used with transgender persons because respondents often require clarification of sex-related questions due to their diversity of sexual anatomy. However, this method of data collection can result in socially desirable responses, particularly with regard to stigmatized behaviors such as URAI, sex work, and sharing injection equipment (Gribble et al. 1999). Future studies are encouraged to supplement interviews with audio computer-assisted self or personal interviewing (A-CASI or A-CAPI) data collection methods because these types of self-administered questionnaires can improve the internal consistency of self-reported HIV risk behaviors and increase the reporting of stigmatized behaviors (Fowler 1998).

Despite these limitations, the findings of this review point out several important implications for future research. Additional research is needed to disentangle the complex relationship between elevated HIV risk behaviors and

individual-level factors, such as psychological and substance use problems, variations in gender identity, need for acceptance and affiliation, and coping with stigma, violence and abuse. Exploration of the extent to which these experiences correlate with HIV risk behaviors can help inform the development of salient intervention programs. Findings from this area of research can be used to tailor psychological counseling and substance abuse treatment for at-risk transgender persons (Clements-Nolle et al. 2006; Maguen et al. 2005). In addition, the effects of hormone treatment on sexual behavior patterns need to be investigated because hormones may override, ameliorate, exacerbate, or have no effect on the biological and socialized sexual behaviors of transgender persons (Nemoto et al. 1999).

Research suggests that persons are more prepared to engage and succeed in behavior change when they have established social support and stability, such as affiliation with families of origin, chosen families, support groups, social organizations, and social networks (Hansen et al. 1996). Therefore, studies are needed to identify the types of social supports and the characteristics of those relationships that are most likely to produce an environment fostering reduced risk behaviors. Research also needs to explore the risk behaviors and social networks of the sex partners of transgender persons (Bockting et al. 2007; Coan et al. 2005). This research will not only identify potential new opportunities for prevention, but can help identify the degree to which transgender populations serve as a “bridge group” to other populations impacted by the HIV epidemic (Clements-Nolle et al. 2001a). Additional research needs to address factors in the lives of transgender persons that can influence their risky behaviors and adoption of safer behaviors. For example, knowing the age at which a transgender person may have lost familial support can help explain employment history, acquired job skills, financial instability, and experience with homelessness or survival sex. Thus, an understanding of life trajectories can help identify the types of social and behavioral interventions needed by transgender persons at different stages during their lives (Jacobs and Freundlich 2006).

Mainstream society currently embraces binary gender assignment according to birth anatomy rather than viewing gender on a continuum (Carr-Paxton et al. 2006). Consequently, public accommodations (e.g., restrooms) and other services may not be equipped to deal with transgender persons. Additional research is needed to identify structural and organizational policy barriers experienced by transgender persons that force a binary gender selection, and how these are related to employment, social services, housing, health and mental health care, and legal assistance. Correlations between these barriers and HIV risk behavior should be investigated. Studies also need to explore ways to decrease discrimination against

marginalized transgender groups, increase the social competency of service providers who work with transgender clients, and improve the interaction between transgender persons and social service providers (Bradford et al. 2004; Clements-Nolle et al. 2006; Kohler 2006; Lurie 2005).

Finally, future research should consider the prevalence of multiple risk behaviors of transgender persons within the individual, interpersonal, and structural contexts identified in this review. Determining whether combinations of risky behaviors and contextual factors are more prevalent within certain subgroups can further enhance the development and implementation of interventions for transgender persons (Stall et al. 2003). This area of research can also help delineate the benefits of separate interventions to address the risk behaviors of subgroups of transgender persons, sets of related interventions for various subgroups, and robust interventions containing a menu of options that can be selected according to the risks and skills of participants.

It is encouraging to note that this review identified three intervention programs developed and tested for transgender populations (Bockting et al. 1999, 2005; Nemoto et al. 2005). Likewise, several additional transgender-specific programs have been developed by community-based agencies (Asian Pacific AIDS Intervention Team 2007; Corado 2006; Hein and Kirk 1999; Mediano and Ilada 2003; Reback and Lombardi 2001; Salcedo 2006; Thompson 2006; Warren 2001). However, none of these programs has been formally evaluated in a rigorous controlled trial (Lyles et al. 2007). Rigorous evaluations of these programs are greatly needed to increase the number of efficacious prevention interventions for this vulnerable and marginalized population. Additional approaches to increase the number of interventions for transgender persons involve the development and evaluation of new interventions or the adaptation of existing evidence-based interventions shown to be effective with other populations (McKleroy et al. 2006; Thompson 2007).

Considering the high rates of HIV infection and risk behaviors among transgender populations identified in this review, prevention programs should promote routine HIV testing of this population. It is also important to develop transgender-specific prevention interventions that address the risk behaviors and contextual factors of HIV risk. It is our hope that the findings of this review and meta-analysis will not only inform the development and adaptation of transgender-specific HIV behavioral intervention programs but will also stimulate additional research addressing the salient HIV prevention needs of high-risk transgender persons.

Acknowledgements Other members of the HIV/AIDS Prevention Research Synthesis (PRS) Team who contributed to this review include (listed alphabetically): Julia B. DeLuca, Linda S. Kay, Cynthia M. Lyles, Mary Mullins, Sima M. Rama, and Sekhar Thadiparthi. The authors thank A. J. King of the California STD/HIV

Prevention Training Center and JoAnne Keatley of the Pacific AIDS Education and Training Center, University of California San Francisco for providing insightful comments on an earlier version of this article. **Disclaimer:** The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the U.S. Centers for Disease Control and Prevention.

References

References marked with an asterisk (*) indicate studies included in the meta-analysis.

- Abdul-Quader, A. S., Heckathorn, D. D., McKnight, C., Bramson, H., Nemeth, C., Sabin, K., Gallagher, K., & Des Jarlais, D. C. (2006). Effectiveness of respondent-driven sampling for recruiting drug users in New York City: Findings from a pilot study. *Journal of Urban Health, 83*, 459–476.
- Asian Pacific AIDS Intervention Team. *STAR (Serving Transgenderers at Risk) Program*. Los Angeles, CA: Asian Pacific AIDS Intervention Team. Retrieved February 1, 2007 from: http://www.apaitonline.org/services_programs_bionic.asp
- Bockting, W., & Avery, E. (Eds.). (2005). *Transgender health and HIV prevention: Needs assessment studies from transgender communities across the United States*. Binghamton, NY: The Haworth Medical Press.
- Bockting, W. O., & Kirk, S. (Eds.) (2001). *Transgender and HIV: Risks, prevention and care*. Binghamton, NY: The Haworth Press.
- Bockting, W., Miner, M., & Rosser, B. R. S. (2007). Latino men's sexual behavior with transgender persons. *Archives of Sexual Behavior*. e-published February 27, 2007.
- *Bockting, W. O., Robinson, B. E., Forberg, J., & Scheltema, K. (2005). Evaluation of a sexual health approach to reducing HIV/STD risk in the transgender community. *AIDS Care, 17*, 289–303.
- *Bockting, W. O., Robinson, B. E., & Rosser, B. R. S. (1998). Transgender HIV prevention: A qualitative needs assessment. *AIDS Care, 10*, 505–526.
- Bockting, W. O., Rosser, B. R. S., & Scheltema, K. (1999). Transgender HIV prevention: Implementation and evaluation of a workshop. *Health Education Research, 14*, 177–183.
- Boles, J., & Elifson, K.W. (1994). The social organization of transvestite prostitution and AIDS. *Social Science and Medicine, 39*, 85–93.
- Bradford, J., Xavier, J., Safford, L. A., & Hendricks, M. L. (2004). *Training public health staff for HIV prevention in transgender communities*. Paper presented at the 132nd Annual Meeting of the American Public Health Association, Washington, DC, November.
- Branson, B. M., Handsfield, H. H., Lampe, M. A., Janssen, R. S., Taylor, A. W., Lyss, S. B., & Clark, J. E. (2006). Revised recommendations for HIV testing of adults, adolescents, and pregnant women in health-care settings. *MMWR: Morbidity and Mortality Weekly Report, 55*, 1–17.
- California Department of Health Services. (2005). *California HIV counseling and testing annual report: January–December 2002*. Sacramento, CA: California Department of Health Services, Office of AIDS. Available at: <http://www.dhs.ca.gov/AIDS/Reports/PDF/2002HIVCTAnnualReport091605.pdf>
- California Department of Health Services. (2006). *California HIV counseling and testing annual report: January–December 2003*.

- Sacramento, CA: California Department of Health Services, Office of AIDS. Available at: <http://www.dhs.ca.gov/AIDS/Reports/PDF/2006/27862003HIVCTAnnRept120106.pdf>
- Carr-Paxton, K., Guentzel, H., & Trombacco, K. (2006). Lessons learned in developing a research partnership with the transgender community. *American Journal of Community Psychology, 37*, 349–356.
- Center for AIDS Prevention Studies. (2001). *What are the HIV prevention needs of male-to-female transgender persons (MTFs)?* San Francisco, CA: University of California, San Francisco. Available at: <http://www.caps.ucsf.edu/pubs/FS/MTF.php>
- Centers for Disease Control, Prevention. (1999). *Compendium of HIV prevention interventions with evidence of effectiveness*. Atlanta, GA: Department of Health and Human Services, Centers for Disease Control and Prevention.
- Centers for Disease Control, Prevention. (2004). Number of persons tested for HIV—United States, 2002. *MMWR: Morbidity and Mortality Weekly Report, 53*, 1110–1113.
- *Clements-Nolle, K., Marx, R., Guzman, R., & Katz, M. (2001a). HIV prevalence, risk behaviors, health care use, and mental health status of transgender persons: Implications for public health intervention. *American Journal of Public Health, 91*, 915–921.
- *Clements-Nolle, K., Wilkinson, W., Kitano, K., & Marx, R. (2001b). HIV prevention and health service needs of the transgender community in San Francisco. In W. Bockting, & S. Kirk (Eds.), *Transgender and HIV: Risks, prevention and care* (pp. 69–89). Binghamton, NY: Haworth Press, Inc.
- Clements-Nolle, K., Marx, R., & Katz, M. (2006). Attempted suicide among transgender persons: The influence of gender-based discrimination and victimization. *Journal of Homosexuality, 51*, 53–69.
- Coan, D. L., Schrage, W., & Packer, T. (2005). The role of male sexual partners in HIV infection among male-to-female transgendered individuals. In W. O. Bockting, & E. Avery (Eds.), *Transgender health and HIV prevention: Needs assessment studies from transgender communities across the United States* (pp. 21–30). Binghamton, NY: The Haworth Medical Press.
- *Conare, K., Cross, L., Little, M., et al. (1997). *Needs assessment of transgendered people in Philadelphia for HIV/AIDS and other health and social services*. Philadelphia, PA: ActionAIDS, Inc., Unity, Inc., and University of Pennsylvania, School of Social Work.
- Corado, R. (2006). *Latino transgender program in Washington, DC*. Paper presented at the United States Conference on AIDS, Hollywood, FL, September.
- Dean, L., Meyer, I. H., Robinson, K., Sell, R. L., Sember, R., Silenzio, V. M. B., Bowen, D. J., Bradford, J., Rothblum, E., White, J., Dunn, P., Lawrence, A., Wolfe, D., & Xavier, J. (2000). Lesbian, gay, bisexual, and transgender health: Findings and concerns. *Journal of the Gay and Lesbian Medical Association, 4*, 102–151.
- *Elifson, K. W., Boles, J., Posey, E., Sweat, M., Darrow, W., & Elsea, W. (1993). Male transvestite prostitutes and HIV risk. *American Journal of Public Health, 83*, 260–262.
- Fowler, F. J. (1998). Design and evaluation of survey questions. In L. Bickman, & D. J. Rog (Eds.), *Handbook of applied social research methods* (pp. 343–374). Thousand Oaks, CA: Sage.
- *Garofalo, R., Deleon, J., Osmer, E., Doll, M., & Harper, G. W. (2006). Overlooked, misunderstood and at-risk: Exploring the lives and HIV risk of ethnic minority male-to-female transgender youth. *Journal of Adolescent Health, 38*, 230–236.
- Gribble, J. N., Miller, H. G., Rogers, S. M., & Turner, C. F. (1999). Interview mode and measurement of sexual behaviors: Methodological issues. *Journal of Sex Research, 36*, 16–24.
- Hansen, D. J., Nangle, D. W., & Ellis, J. T. (1996). Reconsideration of the use of peer sociometrics for evaluating social-skills training. Implications of an idiographic assessment of temporal stability. *Behavior Modification, 20*, 281–299.
- Hein, D., & Kirk, M. (1999). Education and soul-searching: The Enterprise HIV Prevention Group. *International Journal of Transgenderism, 3*. Available at: http://www.symposion.com/ijt/hiv_risk/hein.htm
- HIV Epidemiology Program. (2006). *An epidemiologic profile of HIV and AIDS: Los Angeles County, 2004*. Los Angeles, CA: Los Angeles County Department of Health Services. Available at: http://lapublichealth.org/wwwfiles/ph/hae/hiv/2004_EpiProfile.PDF
- Jacobs, J., & Freundlich, M. (2006). Achieving permanency for LGBTQ youth. *Child Welfare, 85*, 299–316.
- *Kammerer, N., Mason, T., Connors, M., & Durkee, R. (2001). Transgender health and social service needs in the context of HIV risk. In W. Bockting, & S. Kirk (Eds.), *Transgender and HIV: Risks, prevention and care* (pp. 39–57). Binghamton, NY: Haworth Press, Inc.
- Keatley, J. (2006). *Transgender HIV issues: Overview to effective transgender programs institute*. Paper presented at the United States Conference on AIDS, Hollywood, FL, September.
- *Kellogg, T. A., Clements-Nolle, K., Dilley, J., Katz, M. H., & McFarland, W. (2001). Incidence of Human Immunodeficiency Virus among male-to-female transgendered persons in San Francisco. *Journal of Acquired Immune Deficiency Syndromes, 28*, 380–384.
- *Kenagy, G. P. (2002). HIV among transgendered people. *AIDS Care, 14*, 127–134.
- *Kenagy, G. P. (2005a). The health and social service needs of transgender people in Philadelphia. In W. O. Bockting, & E. Avery (Eds.), *Transgender health and HIV prevention: Needs assessment studies from transgender communities across the United States* (pp. 49–56). Binghamton, NY: The Haworth Medical Press.
- *Kenagy, G. P. (2005b). Transgender health: Findings from two needs assessment studies in Philadelphia. *Health and Social Work, 30*, 19–26.
- *Kenagy, G. P., & Bostwick, W. P. (2005). Health and social service needs of transgender people in Chicago. In W. O. Bockting, & E. Avery (Eds.), *Transgender health and HIV prevention: Needs assessment studies from transgender communities across the United States* (pp. 57–66). Binghamton, NY: The Haworth Medical Press.
- Kenagy, G. P., & Hsieh, C. M. (2005). The risk less known: Female-to-male transgender persons' vulnerability to HIV infection. *AIDS Care, 17*, 195–207.
- Kohler, L. (2006). *Primary care for transgender people at risk for or living with HIV*. Paper presented at the United States Conference on AIDS, Hollywood, FL, September.
- Lansky, A. L., Sullivan, P. S., Gallagher, K. M., & Fleming, P. L. (2007). HIV behavioral surveillance in the US: A conceptual framework. *Public Health Reports, 122*, 16–23.
- Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis*. Thousand Oaks, CA: Sage Publications.
- Lombardi, E., & van Servellen, G. (2000a). Building culturally sensitive substance use prevention and treatment programs for transgendered populations. *Journal of Substance Abuse Treatment, 19*, 291–296.
- Lombardi, E. L., & van Servellen, G. (2000b). Correcting deficiencies in HIV/AIDS care for transgendered individuals. *Journal of the Association of Nurses in AIDS Care, 11*, 61–69.
- *Lombardi, E. L., Wilchins, R. A., Priesing, D., & Malouf, D. (2001). Gender violence: Transgender experiences with violence and discrimination. *Journal of Homosexuality, 42*, 89–101.

- Lurie, S. (2005). Identifying training needs of health-care providers related to treatment and care of transgendered patients: A qualitative needs assessment conducted in New England. *International Journal of Transgenderism*, 8, 93–112.
- Lyles, C. M., Crepaz, N., Herbst, J. H., & Kay, L. S. (2006). Evidence-based HIV behavioral prevention from the perspective of CDC's HIV/AIDS Prevention Research Synthesis Team. *AIDS Education and Prevention*, 18(Suppl. 1), 21–31.
- Lyles, C. M., Kay, L. S., Crepaz, N., Herbst, J. H., Passin, W. F., Kim, A. S., Rama, S. M., Thadiparthi, S., DeLuca, J. B., & Mullins, M. M. for the HIV/AIDS Prevention Research Synthesis Team. (2007). Best-evidence interventions: Findings from a systematic review of HIV behavioral interventions for US populations at high risk, 2000–2004. *American Journal of Public Health*, 97, 133–143.
- Maguen, S., Shipherd, J. C., & Harris, H. N. (2005). Providing culturally sensitive care for transgender patients. *Cognitive and Behavioral Practice*, 12, 479–490.
- *McGowan, C. K. (1999). *Transgender needs assessment, December 1999*. New York, NY: HIV Prevention Planning Unit of the New York City Department of Health.
- McKleroy, V. S., Galbraith, J. S., Cummings, B., Jones, P., Harshbarger, C., Collins, C., Gelaude, D., Carey, J. W., & the ADAPT Team. (2006). Adapting evidence-based behavioral interventions for new settings and target populations. *AIDS Education and Prevention*, 18(Suppl. 1), 59–73.
- Mediano, E. E., & Ilada, G. G. (2003). *Addressing life issues in doing HIV prevention in the transgender community*. Paper presented at the 2003 National HIV Prevention Conference, Atlanta, GA, July.
- *Melendez, R. M., Exner, T. A., Ehrhardt, A. A., Dodge, B., Remien, R. H., Rotheram-Borus, M. J., Lightfoot, M., Hong, D., & the National Institute of Mental Health Healthy Living Project Team. (2005). Health and health care among male-to-female transgender persons who are HIV positive. *American Journal of Public Health*, 95, 5–7.
- *Nemoto, T., Luke, D., Mamo, L., Ching, A., & Patria, J. (1999). HIV risk behaviours among male-to-female transgenders in comparison with homosexual or bisexual males and heterosexual females. *AIDS Care*, 11, 297–312.
- *Nemoto, T., Operario, D., Keatley, J., Han, L., & Soma, T. (2004a). HIV risk behaviors among male-to-female transgender persons of color in San Francisco. *American Journal of Public Health*, 94, 1193–1199.
- *Nemoto, T., Operario, D., Keatley, J., & Villegas, D. (2004b). Social context of HIV risk behaviours among male-to-female transgenders of color. *AIDS Care*, 16, 724–735.
- Nemoto, T., Operario, D., Keatley, J., Nguyen, H., & Sugano, E. (2005). Promoting health for transgender women: Transgender resources and neighborhood space (TRANS) program in San Francisco. *American Journal of Public Health*, 95, 382–384.
- *Nemoto, T., Sausa, L. A., Operario, D., & Keatley, J. (2006). Need for HIV/AIDS education and intervention for MTF transgenders: Responding to the challenge. *Journal of Homosexuality*, 51, 183–202.
- *Odo, C., Hawelu, A., & Eo na Mahu o Hawaii. (2001). The extraordinary health needs of Hawaii's Mahu. *Pacific Health Dialog*, 8, 327–334.
- Operario, D., & Nemoto, T. (2005). Sexual risk behavior and substance use among a sample of Asian Pacific Islander transgendered women. *AIDS Education and Prevention*, 17, 430–443.
- Pisani, E., Girault, P., Gultom, M., Sukartini, N., Kumalawati, J., Jazan, S., & Donegan, E. (2004). HIV, syphilis infection, and sexual practices among transgenders, male sex workers, and other men who have sex with men in Jakarta, Indonesia. *Sexually Transmitted Infections*, 80, 536–540.
- Ramirez-Valles, J., Heckathorn, D. D., Vazquez, R., Diaz, R. M., & Campbell, R. T. (2005). From networks to populations: The development and application of respondent-driven sampling among IDUs and Latino gay men. *AIDS and Behavior*, 9, 387–402.
- *Reback, C. J., & Lombardi, E. L. (2001). HIV risk behaviors of male-to-female transgenders in a community-based harm reduction program. In W. Bockting, & S. Kirk (Eds.), *Transgender and HIV: Risks, prevention and care* (pp. 59–68). Binghamton, NY: Haworth Press, Inc.
- *Reback, C. J., Lombardi, E. L., Simon, P. A., & Frye, D. M. (2005). HIV seroprevalence and risk behaviors among transgendered women who exchange sex in comparison with those who do not. *Journal of Psychology & Human Sexuality*, 17, 5–22.
- *Reback, C. J., & Simon, P. (2004). The Los Angeles Transgender Health Study: Creating a research and community collaboration. In B. P. Bowser, S. I. Mishra, C. J. Reback, & G. F. Lemp (Eds.), *Preventing AIDS: Community-science collaborations* (pp. 115–131). New York, NY: Haworth Press.
- *Risser, J. M. H., Shelton, A., McCurdy, S., Atkinson, J., Padgett, P., Useche, B., Thomas, B., & Williams, M. (2005). Sex, drugs, violence, and HIV status among male-to-female transgender persons in Houston, Texas. In W. O. Bockting, & E. Avery (Eds.), *Transgender health and HIV prevention: Needs assessment studies from transgender communities across the United States* (pp. 67–74). Binghamton, NY: The Haworth Medical Press.
- *Rodriguez-Madera, S., & Toro-Alfonso, J. (2005). Gender as an obstacle in HIV/AIDS prevention: Considerations for the development of HIV/AIDS prevention efforts for male-to-female transgenders. In W. O. Bockting, & E. Avery (Eds.), *Transgender Health and HIV prevention: Needs assessment studies from transgender communities across the United States* (pp. 113–122). Binghamton, NY: The Haworth Medical Press.
- *Rose, V., Scheer, S., Balls, J. E., Page-Shafer, K., & McFarland, W. (2003). Investigation of the high HIV prevalence in the transgender African American community in San Francisco. Available at: <http://www2.hawaii.edu/~lgbti/high%20HIV%20Prevalence%20in%20the%20Transgender%20African%20American%20Community.pdf>
- Salcedo, B. (2006). *Projecto Bienstar: Services for Latina transgender women*. Paper presented at the United States Conference on AIDS, Hollywood, FL, September.
- San Francisco Department of Public Health. (2006). *HIV/AIDS epidemiology annual report, 2005*. San Francisco, CA: HIV/AIDS Statistics, Epidemiology and Intervention Research Section, San Francisco Department of Public Health. Available at: <http://www.dph.sf.ca.us/PHP/RptsHIV/AIDS/HIV/AIDSAnnRpt2005.pdf>
- Setia M. S., Lindan C, Jeranjani H. R., Kumta, S., Ekstrand, M., Mathur, M., Gogate, A., Kavi, A. R., Anand, V., & Klausner, J. D. (2006) Men who have sex with men and transgenders in Mumbai, India: An emerging risk group for STIs and HIV. *Indian Journal of Dermatology, Venereology and Leprology*, 72, 425–431.
- Shankle, M. D. (2006). *The handbook of lesbian, gay, bisexual, and transgender public health: A practioner's guide to service*. Binghamton, NY: The Haworth Press.
- Sifakis, F., Flynn, C. P., Metsch, L., et al. (2005). HIV prevalence, unrecognized infection, and HIV testing among men who have sex with men: Five U.S. cities, June 2004–April 2005. *MMWR: Morbidity and Mortality Weekly Report*, 54, 597–601.
- *Simon, P. A., Reback, C. J., & Bemis, C. C. (2000). HIV prevalence and incidence among male-to-female transsexuals receiving HIV

- prevention services in Los Angeles County. *AIDS*, *14*, 2953–2955.
- *Singer, T. B., Cochran, M., & Adamec, R. (1997). *Final report by the transgender health action coalition (THAC) to the Philadelphia foundation legacy fund*. Philadelphia, PA: Transgender Health Action Coalition.
- Solomon, Y., Card, J. J., & Malow, R. M. (2006). Adapting efficacious interventions - Advancing translational research in HIV prevention. *Evaluation and the Health Professions*, *29*, 162–194.
- Spizzichino, L., Zaccarelli, M., Rezza, G., Ippolito, G., Antinori, A., & Gattari, P. (2001). HIV infection among foreign transsexual sex workers in Rome: Prevalence, behavior patterns, and seroconversion rates. *Sexually Transmitted Diseases*, *28*, 405–411.
- Stall, R., Mills, T. C., Williamson, J., Hart, T., Greenwood, G., Paul, J., Pollack, L., Binson, D., Osmond, D., & Catania, J. A. (2003). Association of co-occurring psychosocial health problems and increased vulnerability to HIV/AIDS among urban men who have sex with men. *American Journal of Public Health*, *93*, 939–942.
- *Stephens, T., Cozza, S., & Braithwaite, R. L. (1999). Transsexual orientation in HIV risk behaviours in an adult male prison. *International Journal of STD and AIDS*, *10*, 28–33.
- *Sugano, E., Nemoto, T., & Operario, D. (2006). The impact of exposure to transphobia on HIV risk behavior in a sample of transgendered women of color in San Francisco. *AIDS and Behavior*, *10*, 217–225.
- Sumartojo, E. (2000). Structural factors in HIV prevention: Concepts, examples, and implications for research. *AIDS*, *14*(Suppl. 1), S3–S10.
- *Sykes, D. L. (1999). Transgendered people: An “invisible” population. *California HIV/AIDS Update*, *12*, 1–6.
- *Sykes, D. L., & Truax, S. R. (1999). *Factors related to HIV risk in transgendered people*. Paper presented at the 1999 National HIV Prevention Conference, Atlanta, GA, July.
- Thompson, H. (2006). *Transitions Project*. Paper presented at the United States Conference on AIDS, Hollywood, FL, September.
- Thompson, H. (2007). *Designing effective interventions for transgender populations*. Workshop presented at the 2007 HIV Prevention Leadership Summit, New Orleans, LA, May.
- Warren, B. E. (2001). Sex, truth, and videotape: HIV prevention at the gender identity project in New York City. In W. Bockting, & S. Kirk (Eds.), *Transgender and HIV: Risks, prevention and care* (pp. 145–151). Binghamton, NY: Haworth Press, Inc.
- *Weinberg, M. S., Shaver, F. M., & Williams, C. J. (1999). Gendered sex work in the San Francisco Tenderloin. *Archives of Sexual Behavior*, *28*, 503–521.
- Wiessing, L. G., van Roosmalen, M. S., Koedijk, P., Bieleman, B., & Houweling, H. (1999). Silicones, hormones and HIV in transgender street prostitutes. *AIDS*, *13*, 2315–2316.
- Wilchins, R., Lombardi, E., Priesing, D., & Malouf, D. (1997). *First national survey of transgender violence*. New York, NY: GenderPAC.
- Winningham, A. L., & Seal, D.W. (2003). *Transgender persons: HIV prevention needs*. Milwaukee, WI, Center for AIDS Intervention Research. Available at: <http://www.wihivpts.wisc.edu/library/Download.asp?docid=67>
- Wolitski, R. J., Henny, K. D., Lyles, C. M., Purcell, D. W., Carey, J. W., Crepaz, N., O’Leary, A., Mastro, T. D., Cleveland, J. C., Nakashima, A. K., & Janssen, R. S. (2006). Evolution of HIV/AIDS prevention programs—United States, 1981–2006. *MMWR: Morbidity and Mortality Weekly Report*, *55*, 597–603.
- Xavier, J., Hitchcock, D., Hollinshead, S., Keisling, M., Lewis, Y., Lombardi, E., Lurie, S., Sanchez, D., Singer, B., Stone, M. H., & Williams, B. (2004). *An overview of U.S. trans health priorities: A report by the Eliminating Disparities Working Group*. Washington, DC, National Coalition for LGBT Health. Available at: <http://www.nctequality.org/HealthPriorities.pdf>
- *Xavier, J. M., Robbin, M., Singer, B., & Budd, E. (2005). A needs assessment of transgendered people of color living in Washington, DC. In W. O. Bockting, & E. Avery (Eds.), *Transgender health and HIV prevention: Needs assessment studies from transgender communities across the United States* (pp. 31–47). Binghamton, NY: The Haworth Medical Press.
- Zehender, G., Colasante, C., de Maddalena, C., Bernini, F., Savasi, V., Persico, T., Merli, S., Ridolfo, A., Santambrogio, S., Moroni, M., & Galli, M. (2004). High prevalence of human t-lymphotropic virus type 1 (HTLV-1) in immigrant male-to-female transsexual sex workers with HIV-1 infection. *Journal of Medical Virology*, *74*, 207–215.