

Sex Work and HIV Status Among Transgender Women

Systematic Review and Meta-Analysis

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Background: Transgender women are a key risk group for HIV, and epidemiologic studies have attributed high rates of HIV infection to behaviors associated with sex work in this population. This systematic review compared HIV prevalence among transgender female sex workers (TFSWs) with prevalence among transgender women who do not engage in sex work, male sex workers, and biologically female sex workers.

Methods: We conducted systematic searches of 6 electronic databases, and including studies that met pre-established criteria. We extracted data, appraised methodologic quality, assessed heterogeneity, and organized meta-analyses by comparison group.

Results: We identified 25 studies among 6405 participants recruited from 14 countries. Overall crude HIV prevalence was 27.3% in TFSWs, 14.7% in transgender women not engaging in sex work, 15.1% in male sex workers, and 4.5% in female sex workers. Meta-analysis indicated that TFSWs experienced significantly higher risk for HIV infection in comparison to all other groups (relative risk [RR] = 1.46, 95% confidence interval [CI]: 1.02 to 2.09), and particularly in comparison to female sex workers (RR = 4.02, 95% CI: 1.60 to 10.11). We observed significant heterogeneity among the included studies, along with methodologic limitations and imprecise definitions of sex work and gender.

Conclusions: TFSWs could benefit from targeted HIV prevention interventions, HIV testing, and interventions to help reduce the risk of contracting or transmitting HIV. Structural interventions to reduce reliance on sex work among transgender women may be warranted.

Key Words: HIV, sex work, systematic review, transgender/transsexual

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Transgender women are individuals classified as male at birth but who identify as female. International epidemiologic studies have shown that transgender women are at elevated risk of HIV infection compared with the general population.^{1–7} Factors associated with HIV status in transgender women include unprotected sex with primary male partners, injection drug use, social stigma, and being an ethnic minority.^{8,9} Sex work might further contribute to HIV prevalence in transgender women.¹⁰ Studies suggest that a large proportion of transgender women engage in sex work attributable, in part, to social stigma and employment discrimination, which limit opportunities for income generation and challenge basic survival needs.^{10–12}

In general, sex workers have been shown to experience risk for various adverse health conditions, including HIV and other sexually transmitted infections (STIs).^{13–17} Few evidence-based HIV prevention interventions for sex workers exist, and many health policy approaches to reduce HIV risk for sex workers are challenged by legal frameworks that criminalize prostitution.¹⁸ In previous research, cofactors for HIV risk among sex workers have included soliciting customers from streets (as opposed to working in brothels or other sites), frequent sex with partners of unknown serostatus, inconsistent condom use, low socioeconomic status, homelessness, and dependency on drugs and alcohol.¹⁹ These sex work risks can add to other factors that predispose transgender women to HIV infection, leading to a state of heightened risk among transgender sex workers.^{20–24}

We conducted a systematic review to (1) examine the association between sex work and HIV status among transgender women and (2) assess whether transgender female sex workers (TFSWs) experience higher rates of HIV compared with male and biologically (nontransgender) female sex workers. The goal of this review was to identify all studies that have assessed HIV status in transgender sex work samples compared with non-sex-working transgender women, male sex workers, or biologically female sex workers. We aimed to describe characteristics of these studies, assess their methodologic quality, and conduct meta-analyses of HIV prevalence in TFSWs versus these 3 comparison groups.

METHODS

Inclusion Criteria

We included any study measuring the prevalence of HIV among TFSWs and among at least 1 of the 3 comparison groups described earlier. Study designs included cross-sectional

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studies, cohort studies, and baseline or follow-up data from intervention evaluations. We accepted all studies reporting HIV status based on biologic assessment or self-report; analyses considered both types of assessment separately. It would have been preferable to include only prospective cohort studies measuring the incidence of HIV infection among initially seronegative participants; these studies would have generated stronger causal inferences between the exposure of commercial sex work and the outcome of HIV infection. This was not possible, however, given the paucity of existing research.

No exclusions were made on the basis of geography, definition of “transgender,” or definition of sex work. Study-specific definitions of these terms are provided in Supplemental Table 1 (Supplemental materials are available via the Article Plus feature at www.jaids.com. You may locate this article, and then click on the Article Plus link on the right).

Search

Electronic searches of PubMed, PsycINFO, Sociological Abstracts, EMBASE, Social Services Abstracts, and ASSIA were carried out initially in April 2007 and updated in December 2007 to include studies published during that year. The search included medical subject headings (MeSH) terms for HIV, sexually transmitted diseases (STDs), and terms associated with transgenderism (transsexualism, transvestism, transgender*, transsex*, transvesti*, male-to-female*, and female-to-male*). The search included all studies published since 1980. The *International Journal of Transgenderism* was hand-searched, and all identified existing reviews and primary studies were cross-referenced for additional citations. Expert researchers in the field were contacted to identify unpublished or in-press articles. Although there were no linguistic or geographic search restrictions, articles were excluded if there was insufficient information available in English (eg, from an English-language abstract) to interpret the study.

All records were initially screened by a single author to exclude records that were clearly irrelevant. A short list of records was prepared and reviewed independently by 2 authors. If either author found an article to be relevant, a full-text copy was obtained. All authors approved the final list of included trials; any disagreements about inclusion were resolved by discussion.

Data Extraction

Data were extracted by 2 trained independent coders onto paper forms and included details about study design, methods and results of recruitment, participant characteristics, methodologic quality, assessment of outcomes, analysis, and results. Coders showed high (>90%) agreement, with discrepancies resolved through discussion with a third party. For cohort studies and intervention evaluations, baseline data were extracted for demographic information; authors agreed by consensus whether to include baseline or follow-up data for outcomes. For studies with unclear definitions of sex work, authors agreed on study inclusion/exclusion by consensus based on their assessment of the full research article and the stated aims of the research. When multiple reports existed for a single study, data were extracted from all available papers.

Assessment of Methodologic Quality

We assessed methodologic quality using a modified version of the Newcastle-Ottawa Quality Assessment Scale for cross-sectional and cohort studies,²⁵ appraising the following characteristics:

1. Representativeness: whether the study used strategies to maximize representation of local target populations (eg, targeted venue-based or time-space sampling) versus non-representative (ie, convenience sampling)
2. Comparison: whether the comparison group was selected using the same venues and techniques versus different selection and recruitment techniques
3. Exposure ascertainment: whether a structured face-to-face interview was used to ascertain sex worker status and/or transgender status versus written questionnaires
4. Outcome assessment: whether HIV status was assessed using an independent blinded process or by means of record linkage versus self-report
5. Nonparticipation: whether nonparticipation was <25% of those approached

Analysis

We conducted 4 primary meta-analyses in Review Manager 4.2, a statistical software program developed by the Nordic Cochrane Center (Copenhagen, Denmark) for meta-analyzing data for systematic reviews.²⁶ Analyses compared TFSWs with (1) all others, (2) transgenders who did not engage in sex work, (3) male sex workers, and (4) biologically female sex workers. Two indicators of heterogeneity were calculated: the χ^2 test was used to assess between-study heterogeneity, and the I^2 statistic was calculated to assess the degree to which variability was attributable to between-study differences rather than chance, such that higher I^2 values indicated a greater degree of heterogeneity among studies included in the meta-analysis. Individual studies were weighted according to each study's standard error, with an adjustment for the extent of heterogeneity across studies. When indications of significant heterogeneity arose (χ^2 significant at $P < 0.01$ and $I^2 > 50\%$), we tested differences in pooled estimates using random effects models. We investigated publication bias using funnel plots.

When studies included more than a single comparison group of interest (eg, male and female sex workers), we combined the comparison groups in the meta-analysis comparing transgender sex workers with all others. We then separated the different groups for each of the subsidiary analyses (eg, transgender sex workers vs. male sex workers and then vs. female sex workers). Post hoc analyses examined heterogeneity and relative risk (RR) ratios according to specific methodologic design features of included studies.

RESULTS

The electronic database searches initially retrieved 1096 records (455 from PubMed, 198 from PsycINFO, 181 from EMBASE, 136 from Sociological Abstracts, 89 from Social Services Abstracts, and 37 from ASSIA). We searched for all studies published from January 1980 through December 2007. Cross-referencing retrieved an additional 25 records. After

the removal of duplicate references, 810 unique records (each consisting of a citation and abstract) were screened. Of these, 112 records were deemed relevant by any reviewer and marked for full-text retrieval. Three were unpublished needs assessments that could not be obtained from the authors, and insufficient information was available to determine the inclusion of 2 other studies. Of the 107 papers retrieved, 82 were excluded for reasons specified in Figure 1. Study authors were contacted for missing statistical and descriptive data.

Description of Included Studies

This review includes 25 studies.^{1,3,8,9,27-47} All 3 comparison groups of interest were represented: 14 studies compared transgender women who do and do not engage in sex work,^{3,8,9,27,29,36,38-41,44-47} 6 studies assessed transgender and female sex workers,^{31,33-35,42,43} and 9 studies assessed transgender and male sex workers^{1,27,28,30,32-34,37,42} (4 studies included more than 1 comparison group of interest^{27,33,34,42}).

Studies by Elifson et al^{1,48} and Tirelli et al^{42,49} presented data for TFSWs and the comparison groups in separate papers; thus, these studies each consist of 2 published reports.

Included studies were published between 1988 and 2006. Most were cross-sectional studies, with the exception of 2 prospective cohort studies^{41,44} and 1 retrospective cohort study³ (we analyzed outcome data from follow-up assessments). Sample sizes for the comparisons of interest ranged from 10³⁶ to 1109 participants,³⁴ with a median of 155 across studies. Participants were recruited from 14 countries on 5 continents, including 4 cities in the United States; most sites were large metropolitan cities. Recruitment venues included HIV testing clinics, medical and community-based organizations serving transgender populations, street locations, and social and workplace venues. Definitions of “transgender” women and “sex work” varied and are shown in Supplemental Table 1. Studies generally included information on other behavior risk cofactors, including prevalence of drug use,

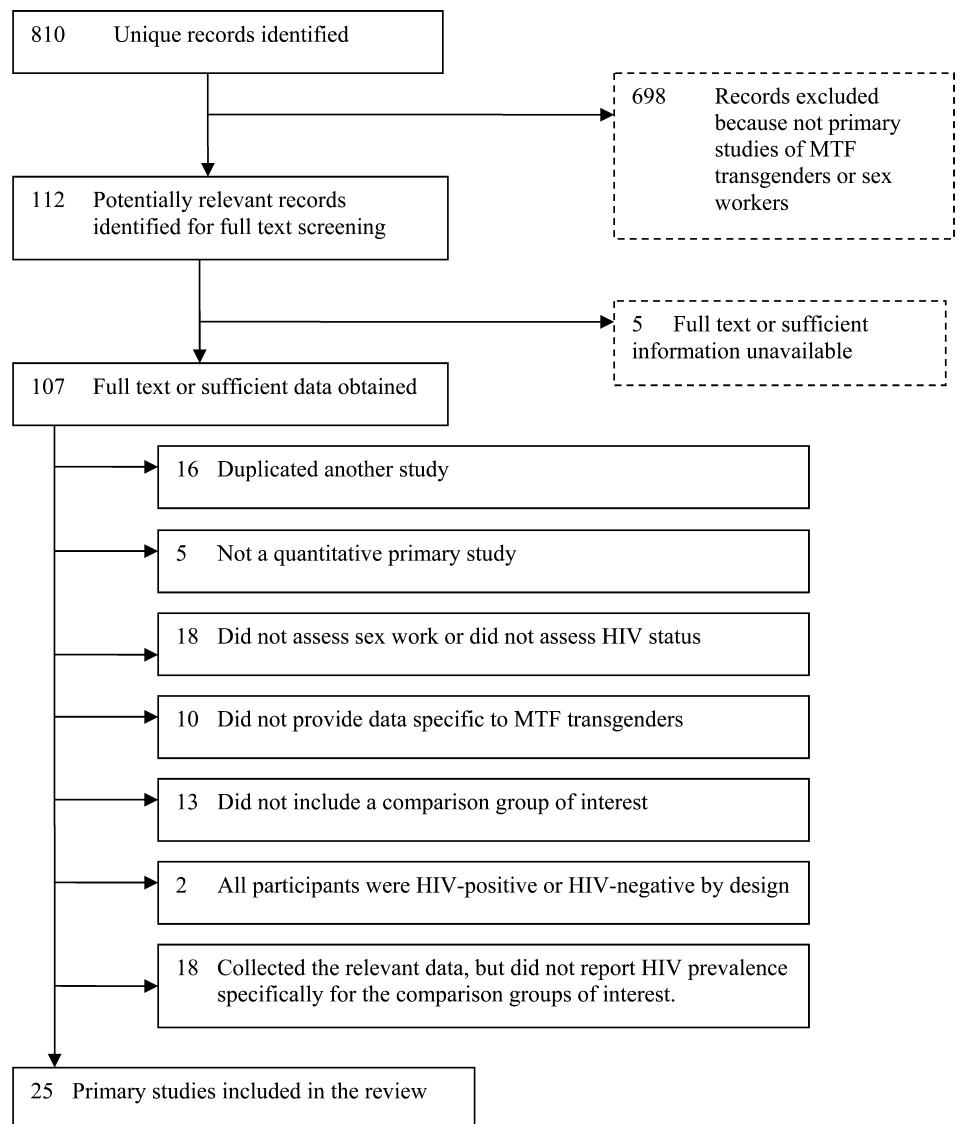


FIGURE 1. Flow diagram of included and excluded records.

injection drug use, and sexual risk behaviors with paying and nonpaying partners; however, not all studies reported identical cofactors and used different recall periods (eg, drug use during the past 3 months, 6 months, or lifetime). Visual inspection of funnel plots did not suggest systematic publication bias.

Quality Appraisal

Study-specific quality assessments seen in Supplemental Table 2 (Supplemental materials are available via the Article Plus feature at www.jaids.com. You may locate this article, and then click on the Article Plus link on the right). Sixteen studies used sampling strategies to improve representativeness, such as targeted venue-based sampling. Several studies attempted to accommodate variation in the length of time participants had engaged in sex work. Most studies recruited comparison groups in the same venues or using the same techniques as for recruiting TFSWs. Where studies reported methods of assessing sex work and transgender status, these characteristics were always self-reported and assessed in a face-to-face interview. As Supplemental Tables 1 and 2 indicate, most studies assessed HIV status using at least 1 standard HIV antibody test, except for 6 studies that accepted self-reported HIV status.^{9,33,39,45-47} Where described, rates of nonparticipation were generally <25% of those approached; 2 studies exceeded this rate,^{37,41} and 12 studies did not specify rates of nonparticipation.^{9,30-33,35,38-40,42,43,45-47}

HIV Prevalence

Studies identified in this review included data from 3159 transgender women (2139 categorized as sex workers and 1020 categorized as nonsex workers), 1633 male sex workers, and 1613 biologically female sex workers. Crude nonweighted HIV prevalence was 27.3% (n = 585) in TFSWs, 14.7% (n = 150) in transgender women not engaging in sex work, 15.1% (n = 247) in male sex workers, and 4.5% (n = 72) in female sex workers. Figure 2 shows weighted RRs and 95% confidence intervals (CIs) for HIV prevalence in each study. Studies are presented stratified by comparison group. An RR >1 indicated that TFSWs had higher HIV prevalence than the comparison group.

Pooling RRs across all 25 studies, the test for heterogeneity yielded a χ^2 value of 134.84 ($P < 0.01$) and I^2 value of 83.7%. We then assessed heterogeneity for each subcategory of studies, grouped according to comparison group. Heterogeneity remained significant in each subsequent analysis: for comparisons with transgender female nonsex workers ($\chi^2 = 53.79$ [$P < 0.01$] and $I^2 = 77.7%$); for male sex workers ($\chi^2 = 38.28$ [$P < 0.01$] and $I^2 = 81.7%$); and for biologically female sex workers ($\chi^2 = 8.30$ [$P < 0.01$] and $I^2 = 51.8%$).

Random effects meta-analysis, which should be interpreted with caution because of heterogeneity, indicated a significant difference in HIV prevalence in TFSWs compared with all other pooled groups (RR = 1.46, 95% CI: 1.02 to 2.09) and a significant difference comparing TFSWs with biologically female sex workers (RR = 4.02, 95% CI: 1.60 to 10.11). Post hoc sensitivity analysis was conducted to examine whether omitting the study by Gras et al³⁰ altered the comparison between TFSWs and biologically female sex workers,

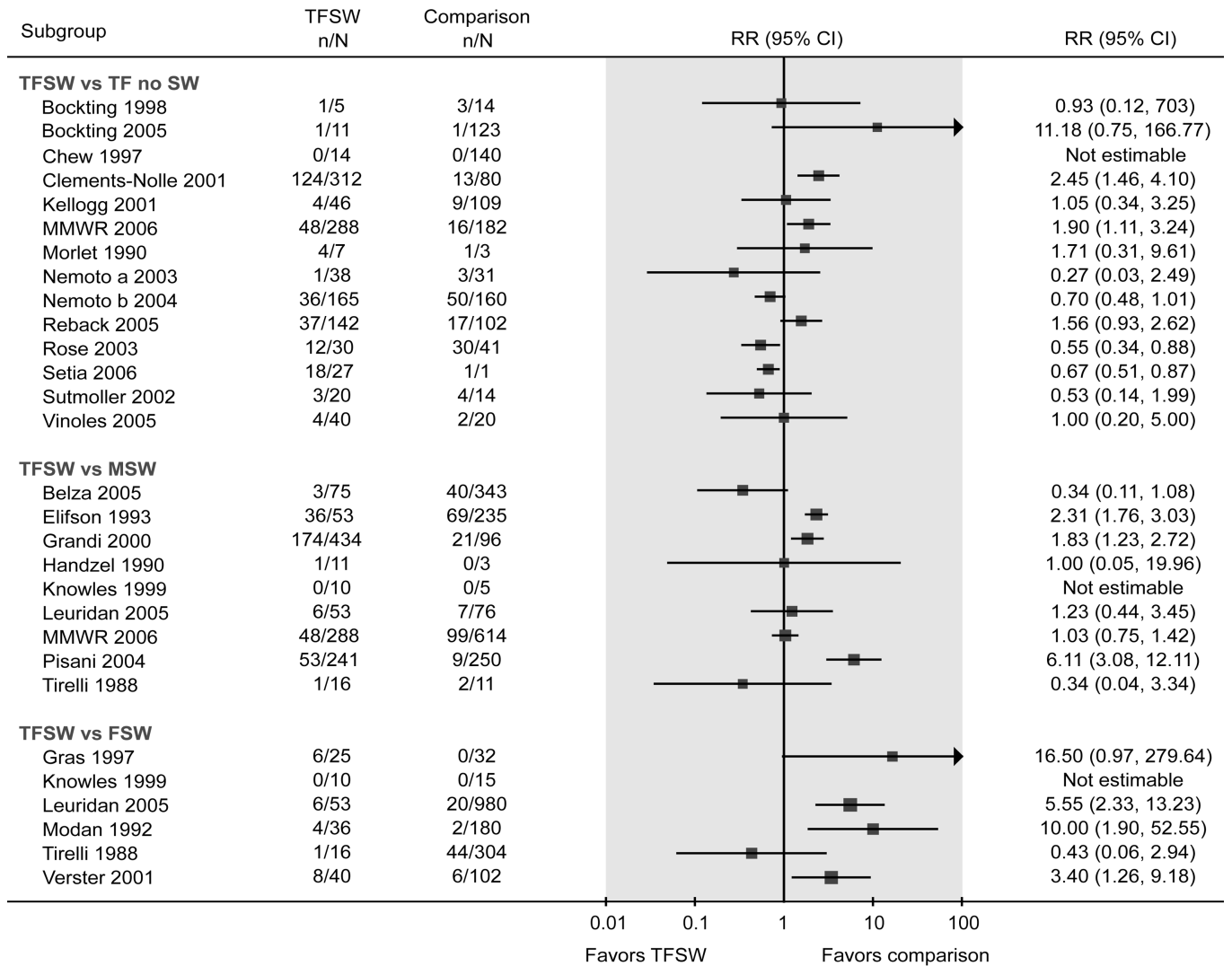
but this effect was shown to remain significant (RR = 3.48, 95% CI: 1.24 to 9.74). No significant differences in HIV prevalence were observed comparing TFSWs with transgender female nonsex workers (RR = 1.06, 95% CI: 0.69 to 1.55) or male sex workers (RR = 1.53, 95% CI: 0.92 to 2.55).

Six additional post hoc meta-analyses were conducted to assess methodologic differences associated with biologic assessment of HIV status versus self-report, representative versus convenience sampling, recruitment of comparison group from the same versus separate sources, ascertainment of exposure using face-to-face interviews versus survey questionnaires, low versus high nonparticipation rate, and collection of data in the United States versus elsewhere. In general, we found no consistent reductions in heterogeneity in these subgroup analyses. Notably, we observed significant differences in HIV prevalence comparing TFSWs with other groups in post hoc meta-analyses that only included studies with more stringent methodologic design features such as biological assessment of HIV status (RR = 1.71, 95% CI: 1.15 to 2.54), studies that used representative sampling techniques (RR = 1.56, 95% CI: 1.01 to 2.42), and studies with low nonparticipation (RR = 1.61, 95% CI: 1.01 to 2.55). Studies conducted outside of the United States showed higher HIV prevalence in TFSWs compared with all other groups (RR = 1.90, 95% CI: 1.52 to 2.37), but HIV prevalence was not different in studies conducted within the United States (RR = 1.24, 95% CI: 0.72 to 2.12). We could not conduct subgroup analysis according to study definitions about type of sex work (eg, direct vs. indirect) because of lack of clarity in forming discrete categories based on reported sex work characteristics.

Sexual risk behaviors as reported in each study are summarized in Supplemental Table 1. In general, studies reported substantial levels of high HIV-related risks among all groups, including unprotected receptive anal intercourse, inconsistent condom use, multiple sex partners, and sex while intoxicated. Studies varied in their specific measures of HIV behavioral risk, with notable differences in time frames for assessed behaviors and indicators of protected versus unprotected sex. Studies also varied as to whether they aggregated or disaggregated HIV behavioral risks according to our target groups. Thus, we were unable to calculate pooled estimates or conduct meta-analysis for behavioral risk indicators.

DISCUSSION

This review aimed to examine whether TFSWs experience elevated HIV prevalence compared with transgender women who do not engage in sex work, male sex workers, and biologically female sex workers. Our analysis included 25 relevant studies enrolling 6405 participants recruited from urban settings in 14 countries. We estimated an overall 27.3% HIV prevalence among TFSWs in this international review, which complements another recent study reporting 27.7% prevalence among transgender women in the United States.⁵⁰ The overall difference in HIV prevalence comparing TFSWs with all other groups was significant according to a random effects meta-analysis. Our subgroup analyses revealed a 4-fold risk for HIV in TFSWs compared with biologically female sex workers. We observed significant



KEY

- TFSW = Transgender female sex workers.
- TF no SW = Transgender females who do not engage in sex work.
- MSW = Non-transgender male sex workers.
- FSW = Non-transgender female sex workers.
- Not estimable = RR could not be calculated because the primary study observed no HIV infections in either group.

FIGURE 2. Prevalence of HIV infection among TFSWs compared with various groups.

heterogeneity between studies, indicating substantial variability not attributable to chance and warranting caution in the interpretation of pooled HIV prevalence estimates.

Heterogeneity among studies can be caused by methodologic differences such as sample representativeness, recruitment of comparison groups, type of exposure ascertainment, type of HIV test, and rates of nonparticipation. Investigating these 5 aspects of methodologic variability in subgroup analyses did not generally reduce statistical indicators of between-study heterogeneity. Notably, higher HIV prevalence among TFSWs was observed in meta-analyses that included only those studies with more rigorous design features, such as biologic HIV assessments, representative sampling techniques,

and low nonparticipation rates, and among studies conducted outside of the United States. Because these were post hoc tests, these subgroup analyses cannot be fully interpreted, although they highlight the variability associated with methodologic heterogeneity in these studies. Another potential source of heterogeneity could include differences in the definitions of transgender women. Although we described how each study operationalized this term, it is possible that meanings and understandings of “transgender” can differ by location, culture, and time, thereby increasing variance among studies.⁵¹ Heterogeneity could also be attributable to differences in definitions of sex work. Again, we described specific designations according to each study, but recognize that sex work

operates in many forms, including the direct trade of sex for money and indirect exchange of sex for goods and services; therefore, sex work might not represent a coherent singular risk factor. Those who engage in sex work can also differ according to frequency of work, volume of clients, type of risk behaviors, and locations of trade.¹⁶

The strengths of this review include its international scope, which allowed for aggregation of many studies from different parts of the world, and its systematic search for evidence, appraisal of methodologic quality, and inclusion of several different comparison groups to investigate the unique associations between sex work and gender identity. Moreover, this is the first known effort to examine the evidence for a within-group factor (ie, engaging in sex work) systematically as a determinant of HIV risk among transgender women.

Limitations of this review must be considered. First, most of the evidence for this review comes from cross-sectional studies, thereby limiting causal interpretations between sex work and HIV status. Second, we observed a potential for bias in primary studies because of nonrandom sampling methods, different or unspecified definitions and assessments of sex work and gender identity, and a lack of description of recruitment rates. Third, because of observed heterogeneity between studies, findings from meta-analysis might not have produced a meaningful and generalizable description of HIV status among TGSWs and comparison groups. Fourth, despite our comprehensive and systematic attempt to search the literature, this review might not have identified all relevant studies, such as unpublished reports and non-English language papers.

Findings from this review have implications for HIV prevention. Overall, this review indicates that as many as 1 in 4 TFSWs is HIV-positive. Although the cross-sectional evidence in this review could not isolate a causal link between sex work and HIV infection in transgender women, this evidence suggests a high rate of infection in TFSWs. Tailoring prevention and HIV testing programs for transgender individuals can potentially reduce further risk for infection and help to identify HIV-positive TFSWs who are not aware of their status. Community health education and HIV prevention programs that target sites where TFSWs meet clients (eg, neighborhoods, streets, bars, dance clubs, Internet Web sites) might be useful in facilitating access to these women. Interventions should consider, separately, strategies for reducing risk with paying partners and with nonpaying partners. Adaptations of effective programs for female sex workers and for heterosexual women might offer a starting point but should incorporate insights into the realities of transgender women. Previous research has shown that public health outreach to TFSWs is improved through hiring and training staff members who represent this community.¹¹ Secondary prevention programs might also be warranted to educate HIV-positive TFSWs on ways to reduce transmission of HIV and other STIs to their clients and nonpaying sex partners. Studies have shown that many transgender women enter into sex work because of discrimination and stigma, which prevent them from engaging in the formal employment sector. Structural programs could aim to reduce employment discrimination and other barriers against transgender women in the workplace. Other structural programs, such as 100% condom policies for sex work environments, have been linked

with significant declines in HIV risk behaviors, but no known evidence-based structural programs provide strategies for facilitating exit from sex work and transitioning former sex workers into formal employment.⁵² Protective public health measures that minimize the number of transgender women who enter sex work, eg through encouraging entrance into the formal work sector and reducing health risks among those that do engage in sex work, could be beneficial.

This review raises several questions for future research. TFSWs were not more likely to be HIV-positive than male sex workers. Reasons for this pattern of association are unclear. This could be attributable to a potential for higher rates of unprotected anal sex among TFSWs and male sex workers compared with biologically female sex workers, but the data did not allow us to test this hypothesis. Similarly, we observed that TFSWs were not more likely to be HIV-positive than transgender women not engaging in sex work, which bears further confirmation and additional understanding through future research. For example, anecdotal reports have suggested that TFSWs might practice more frequent unprotected sex with private nonpaying partners (eg, boyfriends) compared with paying partners because of higher levels of trust and intimacy,⁵³ which might explain the roughly equivalent HIV prevalence among transgender women who engage in sex work and those who do not. Accordingly, interventions that address context- and partner-specific motives for unprotected sex among all transgender women, including those who do and do not engage in sex work, could improve on general approaches to promoting condom use by acknowledging specific interpersonal, economic, and social dynamics that determine heightened risk for HIV and other STIs.

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