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A global research synthesis of HIV and STI biobehavioral risks in female-to-male (FTM) transgender adults

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Abstract

There is a growing interest in HIV infection and sexually transmitted infection (STI) disease burden and risk among transgender people globally; however, the majority of work has been conducted with male-to-female (MTF) transgender populations. This research synthesis comprehensively reviews HIV and STI research in female-to-male (FTM) transgender adults. A paucity of research exists about HIV and STIs in FTMs. Only 25 peer-reviewed papers (18 quantitative, 7 qualitative) and 11 'grey literature' reports were identified, most in the U.S. or Canada, that include data identifying HIV and STI risks in FTMs (five with fully laboratory-confirmed HIV and/or STIs, and five with partial laboratory confirmation). Little is known about the sexual and drug use risk behaviors contributing to HIV and STIs in FTMs. Future directions are suggested, including the need for routine surveillance and monitoring of HIV and STIs globally by transgender identity, more standardized sexual risk assessment measures, targeted data collection in lower and middle income countries, and explicit consideration of the rationale for inclusion/exclusion of FTMs in category-based prevention approaches with MSM and transgender people. Implications for research, policy, programming, and interventions are discussed, including the need to address diverse sexual identities, attractions, and behaviors and engage local FTM communities.

Keywords

transgender; female-to-male (FTM); HIV; STIs

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Conflict of Interest Statement

The authors have no conflicts of interest to disclose.

Overview

There is a growing interest in HIV infection and sexually transmitted infection (STI) disease burden and risk among transgender people globally, but the majority of work has considered only male-to-female (MTF) transgender people (Baral et al., 2013; Herbst et al., 2008). This research synthesis focuses on HIV and STIs among female-to-male (FTM) transgender people. We begin with a review of transgender terminology, briefly consider the diagnostic history of transgenderism and its consequences for sexual health research, and comprehensively and critically review the research literature on HIV and STIs in FTMs globally. We then highlight gaps, opportunities, and future directions. FTMs' diverse sexual attractions, behaviors, and identities are underscored as key to understanding their HIV and STI risk, underscoring the need for gender-affirmative risk assessments that attend to the specific bioanatomies of physical bodies. Findings from this review can be used to inform future research, policy, programming, and interventions in FTM sexual health.

Transgender Identity and Sexuality

The term 'transgender' describes people who do not identify with the sex category assigned to them at birth, or whose gender identity or behavior falls outside of gender norms (Currah & Minter, 2000). *Trans masculine* describes people assigned a female sex at birth who identify on the masculine continuum—as male, men, FTM, transgender men, trans men, men of transgender experience, or affirmed men; or genderqueer (neither male nor female), bi-gender or pangender (both male and female), androgynous, butch, boi, aggressive, and other diverse gender identities and expressions not typically expected of female-assigned sex people. Trans masculine communities are heterogeneous, and not all trans masculine people are stereotypically 'masculine' in their interests or gender presentation. In order to be concise, this review uses 'FTM' as shorthand for transgender men and other trans masculine people, but it is important to note that not all members of the aforementioned groups identify with the 'FTM' label.

'Gender dysphoria' refers to discomfort with the gender that one was assigned at birth (Bockting, 2015). Transgender people use a range of strategies to lessen feelings of gender dysphoria and affirm their gender identities. Gender affirmation can be thought of as having three primary dimensions: (1) social elements, such as adopting a name and pronouns that align with one's gender identity; (2) medical elements, such as masculinizing hormones and/or surgeries; and (3) legal elements, such as changing one's legal name or gender designation. The process of making gender-affirming changes is known as 'gender transition', or simply 'transition'. A gender affirmation process may include any combination of social, medical, and/or legal changes, depending on individual desires, regional law and policy, financial means, life circumstances, and local norms.

It is now clear that transgender people have diverse sexual orientations, identities, and behaviors, and can be sexually attracted to people of any gender (Grant et al., 2011; Kuper, Nussbaum, & Mustanski, 2012). Until recently, however, the study of sexual behavior (and therefore sexual risk) in FTMs has been limited by a narrow schema of transgenderism within psychiatry and other disciplines. In the popular and professional conception of

transgenderism that developed in North America and Western Europe beginning in the mid-twentieth century, ‘true transsexuals’ (who would now be called ‘transgender’) invariably wished to embody the conventional physiology, appearance, and behaviors of the ‘opposite sex’. Those not expected to be gender-conforming in their new sex were denied medical treatment (Meyerowitz, 2004). As a result of these restrictions, transgender communities learned to present themselves to physicians and psychologists as preparing to become traditionally masculine men or traditionally feminine women. Sexual orientation was a crucial part of this gender performance, since people taking on a male gender were expected to be exclusively attracted to females. As a result, many patients concealed non-heterosexual attractions from the professionals treating them, reinforcing the perception that nearly all ‘transsexuals’ were straight (Meyerowitz, 2004). As late as 2013, the American Psychiatric Association (APA) held that ‘virtually all [FTMs] will receive the same specifier—Sexually Attracted to Females—although there are exceptional cases involving [FTMs] who are Sexually Attracted to Males’ (American Psychiatric Association, 2000).

The APA’s stance was reflective of, and influential towards, research in transgender sexual health. As a result of the presumption that FTMs were sexually active almost exclusively with non-transgender women, many researchers have assumed that they are at low risk for HIV and STIs (Kenagy & Hsieh, 2005). More recently, sexual health and sexuality research has documented diverse sexualities and sexual practices among FTMs. Indeed, recent data suggest that FTMs in North America are much less likely to be heterosexual (i.e., attracted primarily to women) than non-transgender men (Grant et al., 2011). Furthermore, even straight-identified FTMs’ sexual practices may put them at risk for HIV and STIs. For instance, they may partner with transgender women, and engage in similar HIV risk behaviors as non-transgender heterosexual couples. They may, like some non-transgender men, identify as straight but nonetheless engage in sex with other men. And certain sexual practices with non-transgender women also carry risks, including HPV exposure—particularly concerning among FTMs, given reduced rates of cervical cancer screening in this group (Peitzmeier, Khullar, Reisner, & Potter, 2014). It is therefore essential that assessment of sexual behavior in FTMs be attentive to the myriad of gender identities in FTMs themselves as well as the heterogeneity of their sexual partners, while also attending to the specificity of physical bodies engaged in sexual behaviors. There is a diverse range of bioanatomies potentially represented among FTMs and their partners during sexual encounters (e.g., surgically unaltered bodies, bodies that have been altered to various degrees depending on individual desires and access to medical technologies). Addressing this diversity is important for determining prevention and care needs, as well as HIV and STI sexual risk. This review captures the current empirical knowledge on how sexual identity and behavior among FTMs produce unique HIV and STI biobehavioral risk patterns in this population.

Literature Review of HIV and STI Risk in FTMs

Review Methodology

Peer-reviewed articles published before August 1, 2014 were collected from PubMed, Embase, Ovid, PsycINFO, CINAHL PLUS, Web of Science, Sociological Abstracts, and

Medadvocates. The review included peer-reviewed articles and grey literature reports that presented FTM-specific data on sexual risk behavior, HIV status, or STI infection. It included both qualitative and quantitative studies.

Articles and citations were downloaded from the databases and organized using citation management software (QUOSA, EndNote X5, and Zotero). In order to ensure that this review was as broad as possible, search terms included MeSH terms for ‘transgender’ cross-referenced with terms for ‘health’ and ‘HIV’. We also included a range of terms similar to transgender, such as ‘FTM’, ‘trans man’, and ‘transman’. Searches for peer-reviewed papers were limited to material published in English. Additional data sources, including the International AIDS Society, the World Professional Association for Transgender Health, and the National Library of Medicine’s Meeting Abstracts, were searched for ‘grey literature’ material.

Results of Review

We identified 25 peer-reviewed papers (18 of which included quantitative data and 7 qualitative data). Two of the qualitative studies lack a direct focus on sexual health, but include content relevant to sexual risk behavior. Eleven ‘grey literature’ sources were identified (7 posters and abstracts, 3 needs assessments, and 1 additional dataset). Overall, 81% of the included literature is quantitative or mixed-methods, and 19% is qualitative.

Table 1 outlines the existing quantitative research. Ten studies had laboratory-confirmed HIV serostatus, documenting 0% (in six studies), 2.2%, 3%, and 4.3% (1 of 23) HIV seropositivity among FTMs.¹ Most studies found self-reported HIV prevalence between 0% and 10%, and self-reported unknown HIV serostatus from 5% to 57%. In comparison, the adult (ages 13+ years) HIV prevalence for the United States, where the majority of the studies were conducted, is approximately 0.7% in males and 0.2% in females (Centers for Disease Control and Prevention, 2012). However, HIV prevalence is estimated to be over 15% among U.S. MSM (Beyrer et al., 2012), and even higher (16% to 68%) among MTF transgender women (Baral et al., 2013; Herbst et al., 2008).

One study had laboratory-confirmed STI screening data for FTMs, revealing a 5% prevalence of Chlamydia. Lifetime self-reported STI history across samples was between 6% and 47%. Across studies, 7% to 69% of FTMs engaged in fluid-exchange genital-genital sexual risk behaviors; this excludes Kenagy (2002) where 91% engaged in ‘high risk’ sexual behavior because the author included unprotected oral sex with female partners. Several studies documented behaviors that may contribute to HIV risk, including sex work, unprotected anal or vaginal sex with male casual partners, low utilization of STI screening and other sexual health preventive services, and high prevalence of psychological distress and substance use.

Insight into motivations for sexual risk behavior was provided by 7 qualitative studies. Table 2 summarizes the results of the 7 qualitative studies, all peer-reviewed, that addressed sexual

¹Stephens, Bernstein, and Philip (2011) reported 10% pre-existing and 2.9% new HIV diagnoses, but data were reported on the basis of clinic visits, such that some individuals were counted more than once.

risk behavior among FTMs. These studies offer valuable insight into the psychosocial and sociocultural context of FTMs' sexual risk behaviors. The most detailed accounts have focused on 'TMSM', that is, FTMs who have sex with men.² According to this literature, many post-transition TMSM describe gay identities or sex with men as a source of validation for their male identities (Bockting, Benner, & Coleman, 2009; Hein & Kirk, 1999; Williams, Weinberg, & Rosenberger, 2013). However, acceptance from male partners is at times uncertain or tenuous, and FTMs sometimes make riskier sexual choices, like agreeing to sex without a barrier, in order to avoid rejection (Clements, Kitano, Wilkinson, & Marx, 1999; Reisner et al., 2010; Rowniak & Chesla, 2013). Some non-transgender men may even attempt to sexually manipulate or coerce FTMs by questioning their gender (Reisner et al., 2010; Rowniak & Chesla, 2013).

The qualitative literature reveals that some TMSM engage in risk behaviors as they explore a new sexual identity, or integrate into a new community or sexual subculture, during or after gender transition. Some FTMs describe a phase of post-transition sexual experimentation, which may involve incidental or intentional risk-taking behavior (Clements et al., 1999). FTMs who join gay men's communities may be particularly sensitive to norms around HIV infection. In communities where HIV-positive status is perceived as normative, FTMs may feel that seroconversion will increase their sense of belonging, and may conceal their HIV-negative status to avoid rejection by HIV-positive partners (Rowniak & Chesla, 2013). In contrast, in communities where HIV-positive status is stigmatized, FTMs may be motivated to avoid HIV infection (Hein & Kirk, 1999), but HIV-positive FTMs may feel doubly marginalized.

Qualitative research has focused on TMSM because they are expected to engage in the highest-risk behaviors, such as anal-penile and vaginal-penile intercourse, more frequently than FTMs who are not sexually active with men. While this attention may be warranted, it should not be to the exclusion of non-MSM FTMs. Some of the TMSM findings can be generalized: the 'gender role trigger,' for instance, may contribute to coercion by partners of any gender. The 'gender role trigger' refers to engaging in behaviors that are consistent with gender role-based expectations and that validate or affirm a current male gender identity, even when such behaviors may place individuals at risk for HIV or STIs. Other dynamics may vary by sexual identity and partner choice. Future research should explore risks specific to FTMs of other sexual identities, including those who have sex with transgender women.

Gaps and Opportunities

There are notable gaps in the epidemiologic literature on HIV and STI risk in FTMs. The most glaring gap is the dearth of research assessing HIV and STIs in this population, and the sexual and drug using behaviors that may render FTMs vulnerable to HIV and STIs. Who are FTMs having sex with? What kinds of sex are FTMs having—prevalence of receptive and/or insertive anal and/or vaginal sex? What are the patterns of sexual partnerships, number of main and casual sexual partners, and sexual network configurations that render

²-TMSM' refers to 'trans men who have sex with men,' in keeping with the use of 'MSM' to refer to 'men who have sex with men' (Reisner, Perkovich, & Mimiaga, 2010).

FTMs as a population at-risk? Is substance use a salient risk factor in sexual encounters? Are there differences in risk between FTMs who have not surgically altered their bodies and those who have? What factors promote resilience in this community, leading to positive sexual health outcomes for FTMs? There are many questions that remain unanswered and represent opportunities for future research.

Existing studies enroll small sample sizes and rely on convenience samples, limiting generalizable prevalence estimates of HIV and STIs. Also lacking are HIV and STI incidence data. Few have used laboratory-confirmed HIV or STI results. Data on HPV infection is particularly limited. There are no studies using longitudinal cohort designs to examine sexual behavior over time. There are few epidemiologic studies of FTM sexual risk outside the U.S. or Canada, and data from lower- and middle-income countries are particularly sparse. Existing research is also limited by inconsistent and imprecise measurement of HIV/STI risk behaviors. Studies rarely separate vaginal and anal sex, do not examine risk by sex partner gender, and differ in timeframes of risk assessment.

Investigation of biomedical and behavioral interventions appropriate for FTM populations has been limited. We were unable to identify any data about biomedical prevention strategies such as microbicides or HIV pre-exposure prophylaxis (PrEP) in FTMs. FTMs are typically excluded from drug efficacy trials, even those that include transgender women (MTFs). When they are enrolled, FTMs have not been recruited or analyzed separately. For instance, NEXT-PrEP, a safety and tolerability study of a PrEP regimen, treated FTM participants as 'female'. Failure to set FTM-specific recruitment targets or document their transgender status has made it impossible to assess drug safety, acceptability, or efficacy within this group. There are also no published efficacy trials of behavioral interventions to reduce HIV and STI risk among FTMs in particular.

Addressing HIV and STI risk among FTMs also requires research into their sexual and social contexts. Little is known about FTMs' partners and sexual networks, and this information is particularly crucial in preventing HIV 'bridging' with MSM communities. Social and structural factors influencing FTMs remain under-investigated, and data are lacking about how FTM identities are conceptualized and enacted in non-Western contexts.

Recommendations for HIV and STI Research in FTMs

Below we offer several recommendations to guide future research efforts based on this synthesis of current research.

Recommendation 1: Routinely collect transgender status information in health surveillance

Capturing transgender identity in health surveillance systems will be essential to understanding HIV and STI prevalence for these populations. At present, most systems do not identify transgender respondents, and transgender status has been inconsistently measured and operationalized. 'Two-question' measures, which assess current gender identity separately from assigned sex at birth, appear to be the most reliable and valid approach, and have been cognitively tested with transgender and non-transgender

participants in the U.S. (Reisner, Conron, et al., 2014; Tate, Ledbetter, & Youssef, 2012). Standardized transgender status measures should be added to venue-based and regional HIV and STI surveillance programs, and FTM- and MTF-specific results should be routinely reported. Efforts should be made to develop survey items that can assess transgender identity in a range of languages, cultural contexts, and geographic areas.

Recommendation 2: Validate and standardize sexual risk behavior assessments

Across HIV and STI research in FTMs, sexual risk behaviors are inconsistently measured and operationalized. This weakness must be addressed with the development of validated and standardized sexual risk assessments, acceptable and cognitively tested with transgender and non-transgender populations alike. Such assessments should ask about specific sexual risk behaviors with male, female, and transgender sexual partners, capturing both the participants' and sexual partners' anatomy and their gender identities. These questions will help to elucidate HIV and STI risk within groups, as well as 'bridging' between groups.

Recommendation 3: Elucidate sex and gender pathways

Sex and gender are recognized globally as core social determinants of health and well-being across a wide variety of geographic settings and contexts (World Health Organization, 2008). *Sex* refers to biological differences among male, female, and intersex people, such as genetics, hormones, secondary sex characteristics, and anatomy. *Gender* typically refers to 'cultural meanings of patterns of behavior, experience, and personality that are labeled masculine or feminine' (Institute of Medicine, 2011). Gender is a multi-dimensional construct that is culturally dependent, and includes gender *identity* (internal sense of being male, female, or another gender), gender *behaviors* (how a person expresses their gender identity through appearance and mannerisms), and gender *beliefs* (cognitive beliefs about gender, gender role conformity, and gender socialization) (Krieger, 2003). Research in FTM health should consider each gender-related dimension's role in HIV and STI risk—alongside biological sex-linked pathways potentiating HIV infection and STIs.

Recommendation 4: Account for a range of gender identities

People who transition from 'female to male' vary in their self-described gender identities. Some understand themselves as fully male, while others see themselves as some combination of male and female, or as another gender altogether. Those who identify as neither fully male nor fully female can be described as 'non-binary'. Gender identity may be context-dependent, may manifest differently across cultures and geographies, and may shift over time.

Non-binary gender identities can introduce challenges to sexuality, since partners may not understand a non-binary gender identity or be willing to affirm it. However, these identities may also result from a reflective process that leads to a more secure sense of self. Bockting et al. (2009) found that for 20% of FTMs in their sample, a binary male identity at the time of transition eventually gave way to a non-binary identity. This shift was not associated with regrets about transition; rather, non-binary identity reflected the perspectives on gender that participants developed through their transition experiences, including a rejection of conventional beliefs about what it means to be male or female. Future research should

acknowledge the range of gender identities in FTMs and consider both the potential challenges and protective effects of non-binary identity for sexual health.

Recommendation 5: Consider social, medical, and legal gender affirmation

For FTMs, medical gender affirmation often includes cross-sex hormone therapy with testosterone, which deepens the voice, causes growth of body and facial hair, redistributes body fat to a more masculine appearance, and causes the menstrual cycle to end. Surgical interventions may include genital reconstructive surgery, mastectomy (known as chest reconstruction or ‘top surgery’), and/or hysterectomy and oophorectomy. Only a minority of FTMs access genital surgeries (e.g., metoidioplasty or phalloplasty), due to a combination of costs, outcomes, complication rates, and personal preference (Grant et al., 2011). However, testosterone therapy induces clitoral growth, which many FTMs find desirable. FTMs often describe their body parts using terms that correspond with their gender identity (e.g., penis or micro-phallus) rather than anatomical sex (i.e., clitoris) and may refer to vaginal sex as ‘frontal sex’ (Adams et al., 2008). Anatomical changes that may accompany testosterone therapy or hysterectomy, such as vaginal dryness, can increase the risk of HIV and STI transmission (Center of Excellence for Transgender Health, 2010), and more research is needed to understand the biological impact of hormone therapy on per-act probability risk of HIV and STI transmission.

Gender affirmation may affect the available pool of sexual partners, choice of sexual partners, sexual behaviors, and levels of sexual comfort and safety. ‘Passing’—being seen or recognized by others as the desired or identified gender—is often an outcome of medical gender affirmation, and can create both sexual opportunities and risks. Adams et al. (2008) found, for instance, that TMSM who ‘passed’ as male had greater access to MSM sexual networks. However, they had to contend with assumptions that they were non-transgender and had penises, forcing them to either disclose their transgender status to interested partners, facing potential rejection, or conceal their bioanatomical differences. Increased ‘passing’ and concurrent social acceptance might increase self-esteem, potentially reducing sexual risk behavior (Rosario, Schrimshaw, & Hunter, 2006), but could also heighten risk by increasing the number of available partners. Research should account for ‘passing’ or ‘recognition’ as a key outcome of gender affirmation, with multiple possible effects on sexual risk.

Recommendation 6: Foreground diversity of sexual attractions, behaviors, and identities

FTMs’ sexual behaviors may include vaginal and/or anal sex with non-transgender women, non-transgender men, and other transgender people (Bauer, Travers, Scanlon, & Coleman, 2012; Bockting et al., 2009). Sexual attractions and behaviors may change over the course of gender transition. For instance, 40% of 605 FTMs recruited online from 19 different countries (83% U.S.) reported a shift in sexual orientation during gender transition, most commonly from attraction to women only to attraction to both women and men (Meier, Pardo, Labuski, & Babcock, 2013). Post-transition FTMs’ male partners are typically gay, bisexual, or queer men, rather than straight-identified men, and sex with MSM may expose FTMs to the high prevalence of HIV and STIs in these communities.

Like non-transgender people, transgender people describe their sexual identities using varying terms, which convey not only the genders of their sexual partners but also subcultural affiliations. 'Queer,' for instance, is the most commonly endorsed sexual identity among FTMs in a Western context (Meier et al., 2013; Reisner, Gamarel, Dunham, Hopwood, & Hwahng, 2013). 'Queer' was originally a derogatory slur used against LGBT people, but has been reclaimed since the early 1990s, particularly by those who reject distinct sexual identities. Communities that form around queer identity (as contrasted with lesbian, gay, or bisexual identity) have historically been more likely to embrace openly transgender people, though this is not universally true (Stryker, 2008).

Transgender men may also participate in communities of gay-identified men, distinct from (though sometimes overlapping with) queer-identified communities. FTMs face prejudice within gay men's communities, but recent developments—including reports from the qualitative literature on TMSM (Adams et al., 2008; Bockting et al., 2009; Williams et al., 2013), and increased production of 'gay FTM' pornography featuring encounters between transgender and non-transgender men—suggest that gay FTMs are more visible than ever before. Psychosocial dynamics, particularly stigma and efforts to avoid rejection, can put FTMs in gay communities at heightened risk for unsafe sexual encounters (Rowniak & Chesla, 2013). Nonetheless, for some FTMs, gay identity is crucial in developing a secure sexual and social identity (Bockting et al., 2009; Hein & Kirk, 1999; Williams et al., 2013).

Research should explore the variety of sexual subcultures that FTMs participate in, which may predict sexual practices (including safer sex practices), degrees of stigmatization or affirmation within sexual networks, and HIV and STI prevalence among partners. Measuring sexual identity—which may include 'straight,' 'gay,' 'bisexual,' 'queer,' or other labels—can help to capture this variability. It is not known whether North American and Western European FTMs' tendency toward non-heterosexual identities and behaviors extends to other cultural contexts; more information is needed on FTMs' sexual attractions, behaviors, and identities in different languages, contexts, and geographic regions.

Recommendation 7: Integrate health and human rights perspectives

Identifying the cultural context and consequences of pathologization is an important step toward human rights for FTMs globally. Social exclusion and repressive (or insufficiently supportive) environments contribute to stigma in health care settings, limit access to health and HIV services, and restrict materials and publications relating to sexual health. The need for protection from non-consensual interventions (such as reparative or conversion therapy, or even 'corrective' rape intended to suppress gender variant identities) is particularly urgent. Sexual health risks in FTMs may be heightened by discrimination in other aspects of life, including employment, housing, and education, that produces social and economic insecurity. For instance, the results of this review suggest that sex work and transactional sex are not unusual among FTMs (Herbst et al., 2008; Reisner et al., 2010; Schulden et al., 2008), representing one path by which economic marginalization can put FTMs at heightened risk for HIV and STIs. Special attention should be paid to the sexual health needs of FTMs in lower- and middle-income countries, a topic on which additional data is sorely needed.

Recommendation 8: Engage FTM communities

Involving FTM communities—research “with” not “on” FTMs—is essential to creating responsive, culturally competent public health research and advocacy efforts. The principles of community-based participatory research (CBPR) represent one potentially valuable framework for research and interventions with FTMs (Leung, Yen, & Minkler, 2004). This approach is consistent with depathologization and human rights perspectives used to advance transgender health research and advocacy in global contexts (International Stop Trans Pathologization Campaign, 2012). Community engagement also ensures that research centers the needs and preferences of local FTMs. Given the extreme variation and rapid evolution of FTM identities and norms, this specificity and local engagement of community is indispensable.

Conclusion: The Way Forward

There is a paucity of data on HIV infection and STIs in FTMs, making it difficult to assess HIV and STI risk in this population. The general lack of awareness about transgender people, and FTMs specifically, exacerbates the problem leaving a large scientific gap. There is inadequate research to assess or determine the nature or level of risk in this population, including the sexual and drug using behaviors rendering FTMs vulnerable to HIV and STIs. Research and interventions with sexual minority populations (e.g., MSM) should be expected to justify their exclusion or inclusion of FTMs to ensure scientific accountability. Studies of MSM should seriously consider including and documenting TMSM sexual risk, and should offer a rationale for any decision to exclude them. Research and interventions with MTFs should consider the needs of local FTMs, and determine whether their work may be of value to this population, particularly in light of shared challenges like sex work and limited health care access. Furthermore, FTM communities worldwide need research, policy, and programming designed for their unique sexual health needs. These projects must consider the diverse sexual identities, attractions, and behaviors in this subpopulation, and should engage local FTM communities in needs assessment, decision-making, and implementation of public health research, policy, and programming.

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Table 1

Summary of FTM sexual behaviors and sexual risk indicators across studies

Study (year)	Location, sampling, design	Number of Participants	Socio-Demographics	Sexual Behaviors	Sexual Risk Behaviors	HIV/STI
Reisner, White, Mayer, and Mimiaga (2014)	Boston, MA; urban community health center (July 2007–Dec 2007); retrospective chart review	23 FTM	<ul style="list-style-type: none">• Mean age 31.6• 52.2% white, 13.0% black, 21.7% Asian/Pacific Islander/Native Hawaiian• 26.1% high school diploma• 34.8% private insurance• 56.5% bisexual, 8.7% gay, 4.3% straight, 30.4% unknown• 21.7% lifetime suicide attempt• 47.8% on hormones	Past three months sexual partners: 30.4% females, 30.4% males, 34.8% both	26.1% sexual risk behavior in past three months (‘i.e., sex with a male without a condom, condom breakage, and anonymous sex partners’)	4.3% HIV positive (one case)
Horvath, Iantaffi, Swinburne-Romine, and Bockting (2014)	U.S. national; convenience sample; cross-sectional survey	523 FTM (43% of total sample of N=1229)	<ul style="list-style-type: none">• Mean age 26.2• 77% white, 1% Hispanic/Latino• 13% high school diploma• 42% income < 2× the 2003 HHS poverty guidelines• 25% rural• 35% lifetime suicide attempt	8% married or civil union	Past three months unprotected penis-anus or penis-vagina sex: 11% with primary partner, 6% with other partner, 16% with any partner	<ul style="list-style-type: none">• 0.4% HIV positive (one case; self-report)• No information on STIs
Bauer, Redman, Bradley, and Scheim (2013)	Canada; respondent-driven sampling; cross-sectional survey.	173 gay, bisexual, or MSM FTM (a subset of the 227 FTM in Bauer et al. 2012)	<ul style="list-style-type: none">• 16.9% history of gender-related physical or sexual assault• 36.1% history of gender-related harassment or threats	<ul style="list-style-type: none">• 45% in monogamous relationship, 18% in open or polyamorous relationship, 12.3% single and dating, 24.6% single and not dating• Past year sex partners: 17.9% 0,	<ul style="list-style-type: none">• Past year fluid-exposed sex: 0.1% receptive anal, 0.0% insertive anal, 9.5% receptive genital, 0.8% insertive genital• 17.5% no past-year HIV risk sexual behavior, 73.3% low/moderate-risk, 9.2% high risk	21.0% past-year HIV testing, 36.3% over one year ago, 42.7% never

Study (year)	Location, sampling, design	Number of Participants	Socio-Demographics	Sexual Behaviors	Sexual Risk Behaviors	HIV/STI
				<ul style="list-style-type: none">45.4% 1-, 22.7% 2–4, 14.1% 5+ Past year: 65.4% received oral sex, 67.2% gave oral sex, 34.2% receptive anal, 29.0% insertive anal, 67.1% receptive genital, 56.6% insertive genital	<ul style="list-style-type: none">15.8% lifetime sex work/exchange sex	
Olson, Clark, Schrager, Simons, and Belzer (2013)	Los Angeles; urban teaching hospital pediatric transgender program; baseline data from prospective study (survey and chart review)	35 FTM (50% of total sample of N=70)	<ul style="list-style-type: none">Total sample 51.5% white, 28.8% Latino/a, 10.6% African American. No data on FTM group alone.Age range 12–24All prior to hormone therapy initiation	No data	6% history of transactional sex	No data
Patrascioiu et al. (2013)	Catalonia; chart review	92 FTM (39% of total sample of N=234)	No data	No data	No data	HIV prevalence 2.2%
Rodolico, Hellen, Nagelberg, Rey, and Levalle (2012)	Argentina; clinic-based cross-sectional survey	18 FTM (25% of total sample of N=71)	No data	<ul style="list-style-type: none">34% practice genital sex34% practice oral sexAnal sex not recorded34% sexual activity in past month50% relationship satisfaction	23% ‘use condoms’	No HIV or STI data
Bauer et al. (2012)	Canada; respondent-driven sampling; cross-sectional survey	227 FTM spectrum (52.4% of total sample of N=433)	<ul style="list-style-type: none">70% non-aboriginal white, 25% non-aboriginal racialized, 6% aboriginal35% high school diploma52% earn < \$15,000 annually	<ul style="list-style-type: none">12% 5+ sex partners in past yearSex partners include: 10% trans men, 21% non-trans men, 7% trans women, 44% non-trans women, 14% genderqueer28% receptive partner in anal sex	<ul style="list-style-type: none">7% high risk = receptive genital sex with flesh genitals (no prostheses or toys) and fluid exposure [0% high risk receptive anal, 0% high risk insertive anal]69% low/moderate risk25% no risk (no past-year sex partners)	<ul style="list-style-type: none">0.6% HIV positive23% HIV serostatus unknown

Study (year)	Location, sampling, design	Number of Participants	Socio-Demographics	Sexual Behaviors	Sexual Risk Behaviors	HIV/STI
			<ul style="list-style-type: none">25% completed medical transition	<ul style="list-style-type: none">57% receptive partner in genital sex15% ever sex work	<ul style="list-style-type: none">42% sex while drunk or high in past year	
Butt, Mena, and Muzny (2011)	United States; literature review of HIV risk behaviors and prevalence	Not applicable	Not applicable	No data	No data	HIV prevalence rates between 0% and 2% among FTMs, except for 10% positive finding in Stephens et al. (2011)
Pell, Prone, and Vlahakis (2011)	Sydney, Australia; private urban clinic with sexual health focus; retrospective chart review	17 FTM (10.8% of total sample N=158)	<ul style="list-style-type: none">Mean age 34.4; range 21.5–56.982.3% Australian-born91.7% employed13.3% history of IVDU93% on hormone therapy23.6% surgery	No data	0% history of sex work	0% HIV positive
Grant et al. (2011)	U.S. national; electronic survey and site-specific paper-and-pen surveys; convenience sample	1776 FTM (28% of total sample N=6346)	<ul style="list-style-type: none">46% queer, 25% heterosexual, 13% gay/same-gender loving, 13% bisexual, 2% other, 2% asexual42% underemployed19% uninsured	7% history of sex work	No data on sexual risk behaviors	0.48% HIV incidence (not analyzed by sexual orientation)
Stephens et al. (2011)	San Francisco, CA; San Francisco City STI Clinic (Jan 2006–Dec 2009); retrospective chart review	69 FTM patient visits (not unique cases; 16 patients had at least 4 visits)	<ul style="list-style-type: none">Mean age 31.5, median 2877% WhiteNo data on SES or health insurance	<ul style="list-style-type: none">Median number of 4.5 (SD=3) non-trans male partners in past 3 months23% transactional sex ever	49% unprotected sex in past 3 months	<ul style="list-style-type: none">10% HIV positive4% HIV unknownDiagnosis at visit: 3.7% rectal GC, 4.9% pharyngeal GC, 11.1% rectal CL, 4.2% urogenital CL, 2.4% pharyngeal CL, 2.1% syphilis morbidity, 4.2%

Study (year)	Location, sampling, design	Number of Participants	Socio-Demographics	Sexual Behaviors	Sexual Risk Behaviors	HIV/STI
						syphilis titer, 2.9% HIV
Chen, McFarland, Thompson, and Raymond (2011)	San Francisco, CA; STI clinic sample; cross-sectional HIV testing data (HIV test sites funded by the SF DPH)	59 FTM	<ul style="list-style-type: none">Median age 27 (18–54)73% white non-Hispanic45% no health insuranceNo data on SES	<ul style="list-style-type: none">Sex partners by gender in past 12 months: 61% male, 63% female, 47% transgenderSexual behaviors with male sex partners in past 12 months: 51% receptive vaginal sex, 19% insertive anal, 39% receptive anal	<ul style="list-style-type: none">63% unprotected receptive sex (vaginal or anal) in past 12 months10% any unprotected sex (vaginal or anal) with known HIV-positive person in past 12 mo32% unprotected anal sex since last HIV test	<ul style="list-style-type: none">0% HIV-positive (lab-confirmed)STI history past 12 months: 2% Gonorrhea, 5% Chlamydia, 2% syphilis
Rowniak, Chesla, Rose, and Holzemer (2011)	San Francisco, CA; convenience sample; semi-structured qualitative interviews	17 FTM (eligibility: age 21+, identify as FTM, on Testosterone hormone therapy for 1 year, understand English)	<ul style="list-style-type: none">Median age 36 (range 23–64)10 participants whiteNo data on SES or health insurance0% had bottom surgery	<ul style="list-style-type: none">82% (n=14) reported having gay men as sexual partners and self-identified as gay, bisexual, or queer5 engaged in sex work	<ul style="list-style-type: none">Only 3 participants reported ‘always using condoms’ for intercourse (type of sex not specified)2 in serodiscordant relationship with non-trans male	<ul style="list-style-type: none">1 participant HIV positive (self-reported)No information on STIs
Johnson, Radix, Santos, Ramos, Mayer, and Mukerjee (2010)	New York, NY; urban community health center	77% FTM clients	No data	No data	40% high risk activity, such as unprotected anal or vaginal intercourse, with men	<ul style="list-style-type: none">No HIV cases among the 40% of clients testedNo information on STIs
Reisner et al. (2010)	New England; convenience sample; cross-sectional, mixed methods design	16 FTM who reported sex with non-trans men	<ul style="list-style-type: none">Mean age 3388% white38% earned < \$11,999 per year31% high school diploma25% no health insurance	<ul style="list-style-type: none">Gender of sexual partners past 12 mo: 100% non-trans males, 69% non-trans females, 56% FTM/trans men, 13% MTF/trans women44% sex work ever19% Sex work past 12 months	<ul style="list-style-type: none">44% unprotected vaginal sex with non-trans male25% unprotected vaginal or anal sex with non-trans female19% unprotected vaginal or anal sex with transgenderUnprotected vaginal sex with mean of 4.0 (SD 9.0) non-trans male sex partners	<ul style="list-style-type: none">0% HIV seropositive (self-report)38% STI history (lifetime)

Study (year)	Location, sampling, design	Number of Participants	Socio-Demographics	Sexual Behaviors	Sexual Risk Behaviors	HIV/STI
Sevelius (2009)	United States, national sample; convenience sample; cross-sectional	45 FTM	<ul style="list-style-type: none">• Age 18–60• 82% white• 10% high school diploma• 24% no health insurance	<ul style="list-style-type: none">• Median # non-trans male partners in past year = 3• 84% oral sex• 69% receptive vaginal sex• 60% anal sex	<ul style="list-style-type: none">• 91% any unprotected oral sex past year with non-trans male• 69% any unprotected receptive vaginal sex in past year with non-trans male• 60% any unprotected anal sex in past year with non-trans male	<ul style="list-style-type: none">• 2.2% HIV• 47% lifetime STI diagnosis
Adams et al. (2008)	Online survey and qualitative interviews with bisexual-, gay-, or queer-identified trans men in Ontario	15 FTM for quantitative online survey; 6 FTM for qualitative interviews	<ul style="list-style-type: none">• 33% income under \$20,000• 93% white• 93% queer, 47% bisexual, 40% gay (multiple responses possible)• 53% university degree	<ul style="list-style-type: none">• 73% receptive anal sex with non-trans men; 60% receptive frontal sex with non-trans men• 87% perform oral sex with non-trans men• 53% fisting• 60% rimming• 73% sex with trans men• 53% BDSM	<ul style="list-style-type: none">• 47% always use condom for frontal sex with non-trans men; 40% most of the time; 7% rarely use• 80% always use condom for anal sex with non-trans men; 13% most of the time• 60% use condom ‘sometimes’ or less for oral sex on non-trans men	0% HIV positive
Schulden et al. (2008)	CBOs in Miami Beach FL, New York City, and San Francisco, CA; convenience sample; cross-sectional survey and HIV testing	42 FTM (7% of the total sample of N=601)	81% racial/ethnic minority (52% non-Hispanic Black, 17% Hispanic)	24% sex work past year	<ul style="list-style-type: none">• 36% unprotected receptive vaginal sex in past year• 29% unprotected receptive anal sex in past year	0% HIV positive (lab-confirmed)
Herbst et al. (2008)	Meta-analysis 29 studies (1990–2004); 15 studies included MTF and FTM transgender people	5 studies	No data	<ul style="list-style-type: none">• 31% sex work• 34% 2+ partners in past 6 months	<ul style="list-style-type: none">• High risk sex behavior in prior 3 months (91%–93%) but behavior not specified• 7% UVS, 4% UAS• 22% Genital–genital contact	<ul style="list-style-type: none">• 0%–3% HIV prevalence (5 studies)• No studies of HIV incidence• 6–7% STI prevalence (lifetime) (2 studies)

Study (year)	Location, sampling, design	Number of Participants	Socio-Demographics	Sexual Behaviors	Sexual Risk Behaviors	HIV/STI
Lobato et al. (2007)	Porto Alegre, Brazil; teaching hospital transgender program; clinic-based descriptive cross-sectional survey	16 FTM (11.6% of total sample N=138)	<ul style="list-style-type: none">87.5% less than high school18.7% history of sexual abuse43.8% psychoactive substance use6.3% history of suicide attempt	Mean age at first intercourse 16.18 years	0% history of sex work	0% prevalence of HIV syphilis, gonorrhea, and chlamydia
Myers, Remis, and Husbands (2007)	Ontario; venue-based cross-sectional survey of MSM (primarily non-trans)	22 FTM (0.9% of total sample N=2,438)	<ul style="list-style-type: none">Mean age 31.818% high school or less59% income less than \$40,00085% white20% lifetime IV drug use	No data	33% (4 of 12 with data) unprotected receptive anal sex with casual partner or regular partner of unknown/positive status in previous six months	<ul style="list-style-type: none">0% of 17 previously tested self-reported positive0% positive of 14 tested in study
Xavier, Homnold, and Bradford (2007)	Virginia; convenience sample; cross-section survey	121 FTM (35% of total sample N=350)	Median age 28 (18–64)	<ul style="list-style-type: none">94 sexually active FTMs in past 6 mo18% non-trans men82% non-trans women11% trans men3% trans women	<ul style="list-style-type: none">71 FTMs with primary partners: 51% unprotected sex15 FTMs with other partners: 47% unprotected sex	<ul style="list-style-type: none">0% HIV positive (self-report)5% HIV unknown25% never tested for HIV
Kenagy (2005)	Greater Philadelphia area; convenience sample using snowball sampling; 2 surveys	69 FTM (37.9% of original sample of N=182)	<ul style="list-style-type: none">Mean age 29.427% white (42% Black, 10% multiracial, 10% Hispanic, 8% biracial, 3% other)54% high school diplomaNo data on health insurance	No data	<ul style="list-style-type: none">59% unprotected sexual activity (mostly oral sex) in past 12 moRacial differences in unprotected sexual activity: 74% FTM of color vs 22% of white FTMs (p<0.001)7% unprotected vaginal-penile intercourse with no condom6% unprotected anal-penile intercourse28% sex while drunk or high	<ul style="list-style-type: none">0% HIV positive8% HIV status unknownNo information on STIs

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Study (year)	Location, sampling, design	Number of Participants	Socio-Demographics	Sexual Behaviors	Sexual Risk Behaviors	HIV/STI
					<ul style="list-style-type: none">9% sex with HIV-positive partner	
Kenagy and Hsieh (2005)	Philadelphia, PA and Chicago, IL; 2 needs assessments	62 FTM (34% of the original sample of N=192)	<ul style="list-style-type: none">Mean age 26.835% White, 33% Black, 32% other54% high school or less	No data	<ul style="list-style-type: none">71% no protection used during last time having sex81% high risk sexual activities in past 3 months: [“High risk”= vagina-penis, anal-penis, oral-penis, oral-vagina, oral-anal sex, or sex with someone known to be HIV positive without using a condom or a latex barrier]	No data
Sperber, Landers, and Lawrence (2005)	Boston, MA; RDS, convenience sample; focus groups	17 FTM (50% of the original sample of N=34)	<ul style="list-style-type: none">Mean age 27.988% white, 6% Latino, 6% other41% bisexual, 29% straight, 18% gay, 6% queer, 6% none6% uninsured	No data	No data	No data
Bockting, Robinson, Forberg, and Scheltema (2005)	Minnesota; pilot evaluation of transgender sexual health intervention	34 FTM (19% of total sample N=181)	No data	<ul style="list-style-type: none">61% had primary partner (67% non-trans female, 10% non-trans male, 24% transgender)68% attracted to women only, 15% attracted to men only, 18% attracted to both, 29% attracted to trans persons	<ul style="list-style-type: none">9% report difficulty controlling sexual behavior56% unprotected oral sexNo significant difference from MTF group on rates of unprotected anal or vaginal intercourse (27% in total sample)	Not reported separately for FTM group
Xavier, Bobbin, Singer, and Budd (2005)	Washington, D.C.; cross-sectional convenience/snowball sample	60 FTM and female-assigned gender-variant people (24% of total sample of N=248)	<ul style="list-style-type: none">Median age 2612% identified as man; 38% woman; 45% transgender75% African American; 12% white43% of adults high school or less23% unemployed	27% gay; 45% lesbian; 11% bisexual	<ul style="list-style-type: none">53% unprotected oral sex in past year50% unprotected genital sex in past year20% sex while inebriated in past year10% unprotected anal sex in past year	3% HIV positive

Study (year)	Location, sampling, design	Number of Participants	Socio-Demographics	Sexual Behaviors	Sexual Risk Behaviors	HIV/STI
			<ul style="list-style-type: none">• 26% income under \$15,000• 12% using hormones		<ul style="list-style-type: none">• 0% unprotected sex with known HIV+ person in past year	
Gross and Davis (2004)	Los Angeles, CA; cross-sectional survey	30 FTM (46% of total sample of N=65)	No data	No data	<ul style="list-style-type: none">• 'High rates' of sex while intoxicated• Lower rates of condom use than MTF group	No data
Kenagy (2002)	Philadelphia, PA; convenience sample; mixed methods	32 FTM (39.5% of the original sample of N=81)	<ul style="list-style-type: none">• Mean age 26.4• 60% Black, 13% multiracial, 13% other (Hispanic and white)• Highest grade attended: Mean 12.1 grade	No data	91% engaged in 'high risk' sexual activity (defined as vagina-penis, anal-penis, oral-penis, oral-vagina, oral-anal, or vagina-vagina sex without a condom or dental dam)	<ul style="list-style-type: none">• 0% HIV positive (self-report)• 57% never had HIV test• 6% STI history• 66% never tested for STDs
Clements-Nolle, Marx, Guzman, and Katz (2001)	San Francisco, CA; RDS, targeted/purposive sampling; cross-sectional survey and HIV testing	123 FTM (23.9% of total sample N=515)	<ul style="list-style-type: none">• Median age 36 (range 19–61)• 67% White, 10% Black, 11% Latino, 7% API, 4% Native American• 4% less than high school diploma• 41% no health insurance	31% sex work ever	<ul style="list-style-type: none">• Unprotected receptive anal sex: 27% with male, 6% with transgender• Unprotected vaginal sex: 63% with male, 25% with transgender	<ul style="list-style-type: none">• 2% HIV positive (lab-confirmed)• No data on STIs

Table 2

Summary of qualitative study content

Williams et al. (2013)	Interviews with 25 FTMs in San Francisco. Discusses gay trans men, sexual identity as 'bottom' (receptive partner), and sex with men as an affirmation of masculinity, which other studies have linked to sexual risk behavior Reisner, White, et al. (2014); Rowniak and Chesla (2013). Considers role of anatomy, and hormonal and surgical interventions, in sexual behavior.
Rowniak and Chesla (2013)	Interviews with 17 FTMs in San Francisco. 10 participants identified as gay, and none as heterosexual. One participant became HIV positive shortly after gender transition. Another recalled undertaking risky behavior in an effort to fit in with other gay men, many of whom had HIV. Others described trans men who have acquired HIV at male sex venues, and explained that some non-trans men 'take advantage' of FTM partners for barrier-free sex.
Kosenko (2011)	Semi-structured interviews with transgender adults in the United States, including 15 FTMs, mostly 'mid-transition.' Participants described a lack of safer-sex education targeting lesbian communities, in which they had participated before transition. They also described a lack of confidence navigating sexual situations as gay males, absence of FTM-specific sexual health information, and the effect of hormone therapy on sex drive.
Bockting et al. (2009)	Interviews and psychological assessments with 25 FTMs attracted to men (60% self-described gay, 32% bisexual, and 8% queer) in the United States and Canada. FTM participants were more likely to be bisexual than non-transgender controls, were comfortable with their sexual orientation and gender identity, and were similar to controls in sexual satisfaction and self-esteem.
Namaste (1999)	Interviews with 5 FTMs in Quebec, and a discussion group at an FTM conference in Boston. FTMs reported not considering themselves at risk for HIV, and participants cited 'low self-esteem' as contributing to sexual risk behavior.
Hein and Kirk (1999)	Description of an HIV risk reduction group intervention for Boston-area TMSM. The intervention focused on mutual support and strategizing for the challenges the participants encountered in sexual interactions with non-trans men. Participants reported strong motivation to remain HIV negative.
Clements et al. (1999)	Focus groups with MTF and FTM residents of San Francisco. Participants reported that 'low self-esteem' was a primary reason for sexual risk-taking, and that affirmation via sex with non-trans partners motivated sexual risk behavior. For FTM participants, trying unprotected sex was sometimes part of a gender exploration process, body dissociation made it more difficult to practice barrier use, and sex drive changes related to hormone use increased sexual risk-taking.