Situated Vulnerabilities, Sexual Risk, and Sexually Transmitted Infections' Diagnoses in a Sample of Transgender Youth in the United States

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Abstract

In the United States, sexually transmitted infections (STIs) confer significant morbidity in adolescents and young adults. STIs are not well characterized in transgender and other gender minority youth (TGMY) who have a gender identity that differs from the sex assigned to them at birth. This study sought to fill this gap. In 2015–2016, the Adolescent Medicine Trials Network for HIV/AIDS Interventions conducted Protocol 130, Affirming Voices for Action, enrolling a diverse sample of TGMY 16–24 years of age from 14 US geographic locations. Multivariable analyses regressed lifetime STI diagnosis on “situated vulnerabilities” (demographics, social/economic issues, mental/behavioral health conditions, and health care experience). Approximately one-third were living with HIV infection (31%); 33% had a history of one or more STIs, excluding HIV. The most frequently diagnosed STIs were 55% chlamydia, 48% syphilis, and 47% gonorrhea. The odds of STI was 4.06 times higher for trans feminine youth assigned a male sex at birth compared to trans masculine youth assigned a female sex at birth ($p=0.03$). Additional risk factors for lifetime STI were as follows: nonbinary gender identity ($p=0.004$), medical gender affirmation ($p=0.03$), and transactional sex ($p=0.01$). Nearly one-third (31%) reported condomless vaginal and/or anal sex in the last 6 months, suggesting a need for ongoing STI prevention, screening, diagnosis, and treatment. TGMY are a vulnerable group to STIs in need of public health attention. Clinical care for STIs will benefit from considering risk factors facing youth in general (e.g., sex work), alongside those vulnerabilities unique to TGMY (e.g., medical gender affirmation).

Keywords: sexually transmitted infections, transgender, gender minority, youth

Introduction

IN THE UNITED STATES, sexually transmitted infections (STIs) are on the rise and represent a major public health problem associated with significant morbidity, including poor health and HIV transmission risk.¹ According to the Centers for Disease Control and Prevention (CDC), roughly half of new STIs nationwide in 2016 were among young people 15–24 years of age.¹ Adolescent and young adult groups disproportionately impacted by STIs include youth of color and gay, bisexual, and other men who have sex with men.¹

Recent research has aimed to increase rates of STI testing among youth.² However, to our knowledge, no national data exist to characterize STIs³ in transgender and other gender minority youth (TGMY) who have a gender identity that differs from their sex assigned at birth. This is because TGMY are not routinely “counted” in STI surveillance systems using a methodology that allows for disaggregation of results by gender identity.¹

TGMY are a diverse youth group, comprising varied gender identities, and terminology to describe TGMY communities is constantly evolving. We use the term *trans feminine* (TF) youth to refer to young people assigned a male sex

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at birth and identify as girls, women, female, male-to-female, transgender (TG) women, or another gender identity that differs from their assigned birth sex. *Trans masculine* (TM) youth refers to those assigned a female sex at birth and identify as boys, men, male, female-to-male, TG men, or another gender identity not corresponding to their birth sex.

Our TF and TM categories are inclusive of *nonbinary* youth, those who identify their gender identity in a way that does not adhere to the traditional female–male gender binary, such as genderqueer, genderfluid, gender nonconforming, or as any other gender identity different than their assigned sex at birth. Youth assigned a male sex at birth may therefore have a binary (e.g., female and woman) or a nonbinary (e.g., genderfluid) gender identity; however, these youth are categorized within the TF spectrum. Likewise, TM youth may be binary (e.g., male and men) or nonbinary (e.g., genderqueer).

Local area studies of TGMY demonstrate high prevalence of sexual risk behaviors.^{4–10} For example, in one clinic-based study of 145 sexually active TGMY drawn from an urban community health center in New England, nearly half of the sample was found to have engaged in condomless vaginal and/or anal sex.⁴ TF youth are highly burdened by HIV, which has translated into robust HIV disparities in adult TF populations^{11–13}; however, data are needed to characterize other more common STIs in TF youth. Additionally, it is critical to describe STIs and related risks across the spectrum of gender diversity that exists in youth. Some research has found similar rates of STIs (e.g., syphilis, gonorrhea, and chlamydia) for TF and TM youth.⁴

There are currently no STI data reported about nonbinary youth; there may be unique risks associated with having a nonbinary identity that could increase rates of STIs and sexual risk behaviors. Further, to fully understand STIs and related risks in TGMY, it is necessary to situate sexual health alongside other health and social conditions disproportionately burdening TG populations. These include the following: social stigma and economic marginalization,^{5,7,8,14–16} mental and behavioral health conditions,^{5,15–18} substance use (e.g., alcohol and illicit drug use),¹⁹ violence and victimization,⁷ and health care barriers.^{18,20,21} The myriad “situated vulnerabilities”²² TGMY face may increase risk for STIs and sexual risk, and have implications for future interventional research for gender diverse youth.

This study sought to (1) characterize the prevalence and distribution of STI-related outcomes in a sample of diverse TGMY 16–24 years of age drawn from 14 geographic locations in the United States and (2) investigate the “situated vulnerabilities” for STI-related outcomes, including demographic factors, social and economic issues, mental and behavioral health conditions, and health care experiences, with particular attention to identifying subgroups of youth at highest risk for focused prevention efforts. In addition, the study compared TF and TM youth to assess gender identity differences in STI-related outcomes and risks.

Methods

Data source

In 2015–2016, with funding from the National Institutes of Health, the Adolescent Medicine Trials Network for HIV/AIDS Interventions (ATN) launched and implemented ATN Protocol 130, “Assessing the Engagement of Trans-

gender and Other Gender Minority Youth Across the HIV Continuum of Care.” ATN 130 (known as Affirming Voice for Action, or AVA, in study communities) was a multi-center observational study to cross-sectionally characterize the full HIV Continuum of Care in a US national sample of TGMY 16–24 years of age.

Purposive sampling was used to recruit the sample from catchment areas of 14 Adolescent Medicine Trials Unit (AMTU) sites, stratified by engagement and nonengagement in HIV care. Inclusion criteria were TGMY 16–24 years of age: (1) currently in HIV care at an AMTU site or elsewhere and (2) living with HIV, but *not* currently in care, not living with HIV, or unaware of HIV status. Eligibility was verified using the recommended two-step method, which asks assigned sex at birth followed by current gender identity.²³

The study was conducted using a “participatory population perspective,”²⁴ working “with” not “on” TGMY communities nationally. A national Youth Advisory Board (YAB) of TGMY was consulted throughout the study to guide the research team. In collaboration with the YCAB, recruitment focused on TGMY communities inside and outside of care in the catchment areas of each AMTU site. Recruitment methods included engaging community groups, offering provider referrals, conducting in-person outreach, and disseminating study information through social media, e-mail listservs, and word-of-mouth referral. A total of 181 TGMY contributed quantitative data. For this study, 172 TGMY were included in the data analytic sample; nine TGMY had missing data that prevented them from being included in this analysis.

Procedures

Following an informed consent process, TGMY completed a self-reported electronic quantitative assessment. A qualitative interview was also conducted to identify barriers and facilitators to sexual health care. The overall study was guided by a combination of gender minority stress,²⁵ gender affirmation,²⁶ syndemics,²⁷ and social ecological frameworks. The study visit took ~2.5 h to complete and were monetarily compensated for their time in accordance with local site standards. Institutional review boards at the 14 AMTU sites, and investigators’ institutions, approved all study activities. Additional study details can be found elsewhere.²⁸ Only quantitative data were utilized for this study.

Measures

All measures were included with input from the YAB who guided the overall study design and implementation. The following variables were utilized for this study, all self-reported by TGMY participants:

Outcomes: sexual risk and STIs

Condomless vaginal and/or anal sex, last 6 months. A validated assessment standardly used across ATN network projects was adapted with input from the YAB to be gender affirming and to capture the diverse range of sexual practices and behaviors in which TGMY may engage. Youth were queried about the gender identity of their sexual partners (male, female, and TG). Skip patterns were programmed to be responsive to the anatomy TGMY reported having, and to

the anatomy TGMY reported their sexual partners having. Sexual risk episodes were queried and whether or not (and how often) condoms and/or other barriers were utilized was asked. Condomless vaginal and/or anal sex in the last 6 months (yes/no) was coded as a sexual risk outcome.

Sexually transmitted infections. Youth self-reported their STI screening and frequency of screening, history of STI diagnosis (lifetime), and type of STI diagnoses (e.g., syphilis, gonorrhea, and chlamydia) received. Lifetime STI diagnosis (yes/no) was operationalized as an outcome. HIV testing and HIV serostatus in this sample have been reported on elsewhere.²⁹

Statistical predictors: situated vulnerabilities

Demographics factors. Age (continuous in years), gender identity (TF/TM), binary gender (yes/nonbinary), ethnicity (Latinx yes/no), race (white, black/African American, American Indian/Alaska Native, Asian/Native Hawaiian/Pacific Islander, another race), youth of color (yes/no), and region (Mid-Atlantic, Midwest, Northeast, South, West).

Social and economic issues. Low family socioeconomic status (SES; family receiving government support; yes/no), homeless ever (yes/no), sex work lifetime (yes/no), jail/juvenile detention/incarceration ever (yes/no), and discrimination/enacted stigma in the last 30 days (yes/no).³⁰

Mental health and behavioral health conditions. Screeners for depression [Patient Health Questionnaire-2 (PHQ-2); range, 0–6; positive screen score 3+]; anxiety [Generalized Anxiety Disorder 7-item (GAD-7) scale;³¹ range, 0–21; positive screen score 10+]; alcohol and substance use (CRAFFT 6-item substance abuse screening test for adolescents;^{32,33} range, 0–6; positive screen score 2+); and childhood violence/victimization ever (lifetime history of any physical and/or sexual abuse at <15 years of age; yes/no).

Health care experiences. Health insurance (yes/no), medical gender affirmation (hormones or surgery/neither; yes/no), nonprescription hormone use (yes/no), and barriers to health care due to being TG (yes/no) and due to cost (yes/no).

Statistical analysis

Quantitative analyses descriptively characterized the study sample, including describing the distribution of STI-related outcomes by gender identity category (TF vs. TM). Descriptive statistics [mean, standard deviation (SD), and frequencies] were computed for all variables of interest. Cross-tabs by gender identity category were examined. Demographic, social and economic, mental health, and health care indicators were then described alongside STI-related outcomes. Bivariate unadjusted statistics were estimated (*t*-test and chi-square test).

Two STI-related health outcomes were selected for modeling: Outcome 1: condomless vaginal and/or anal sex, last 6 months and Outcome 2: STI diagnosis. Multivariable logistic regression models were fit using a block modeling approach for each outcome: (1) Model 1: demographics, (2) Model 2: Model 1 + social and economic, (3) Model 3: Model 2 + mental and behavioral health, and (4) Model 4: Model 3 + health care. This modeling approach was implemented due to

sample size limitations. Because data were from 14 sites, region was included as a fixed effect in all models (comparing Mid-Atlantic, Midwest, Northeast, and South vs. West). SAS 9.4.1 was used for analyses with statistical significance at the α 0.05 level.

Results

Descriptive characteristics

Among the 172 participants analyzed, 77% of individuals were TF and 23% were TM (Table 1). Within TF and TM categories, 22% and 34% of youth were nonbinary, respectively. The mean age was 20.7 (SD=2.2). The majority (69%) were youth of color with 65% identifying as black or African American. Half of participants were ever homeless, 54% experienced low family SES, and 79% self-reported experiencing discrimination/enacted stigma in the last 30 days. Forty-five percent of TGMY ever engaged in sex work, a significantly higher percentage of TF compared to TM youth (50% vs. 27%, $p=0.008$). In addition, 39% of participants were ever incarcerated, with TF youth overrepresented relative to TM youth (46% vs. 17%, $p=0.001$).

Medical gender affirmation through hormones and/or surgery was received by over half of individuals (52%) and by significantly more TM than TF participants (66% vs. 47%, $p=0.038$). TM youth also endorsed experiencing more barriers to health care due to being TG (34%) than TF youth (14%, $p=0.0003$).

Sexual risk in last 6 months

The average number of sexual partners in the last 6 months per participant was 7 (SD=19.5) with no significant difference between TF and TM youth (Table 2). The average number of sexual partners living with HIV in the last 6 months was 1.2 (SD=5.0) with TF youth having an average of 1.5 sexual partners living with HIV (SD=5.6) compared to zero in TM youth ($p=0.0008$). Within the last 6 months, 31% of youth engaged in any condomless receptive or insertive vaginal and/or anal sex, significantly more TF youth compared to TM youth (40% vs. 5%, $p<0.0001$). The only significant difference seen in type of condomless sex by gender was for condomless receptive anal sex where 31% of TF youth engaged in condomless receptive anal sex compared to 2% of TM youth ($p<0.0001$).

STI screening and history

Seventy two percent of individuals had ever been screened for STIs with a lower proportion (61% vs. 76%) of TM youth ever being screened compared to TF youth; however, this was not a significant difference ($p=0.069$; Table 3). One-third (33%) ever had an STI in their lifetime, with significantly more TF than TM youth (39% vs. 15%, $p=0.004$). A significant difference by gender was seen for syphilis, diagnosed in 55% of TF youth compared to 0% of TM youth ($p=0.017$). In addition, among those with STI history, 33% of TM reported that they had an “other” STI versus 3.9% of TF youth ($p=0.051$).

Overall, 31% of the sample was living with HIV, all of whom were TF youth (the proportion of TF youth living with HIV was 41%). No TM were living with HIV in this sample. A higher proportion of TF youth living with HIV had been screened for STIs than TF youth without HIV (83% vs.

TABLE 1. DESCRIPTIVE CHARACTERISTICS OF THE OVERALL SAMPLE OF US TRANSGENDER AND OTHER GENDER MINORITY YOUTH (N=172) WITH COMPARISONS OF TRANS FEMININE AND TRANS MASCULINE YOUTH

	Total sample (n = 172), 100.0%	Trans feminine (n = 131), 76.8%	Trans masculine (n = 41), 23.2%	Test statistic ^a	p
Demographic					
Age in years (range, 16–24), mean (SD), [median, IQR]	20.69 (2.22) [21.00 (4.00)]	20.84 (2.22) [21.00 (4.00)]	20.20 (2.16) [20.00 (3.00)]	1.63 (170)	0.1045
Gender identity					
Binary (TG woman, TG man)	129	75.0	77.9	27	65.9
Nonbinary (genderqueer and genderfluid)	43	25.0	22.1	14	34.2
Ethnicity					
Latino/Hispanic	49	28.5	26.0	15	36.6
Race					
White youth	53	30.8	24.4	21	51.2
Youth of color	119	69.2	75.6	20	48.8
Black or African American	112	65.1	74.1	15	36.6
American Indian/Alaska Native	15	8.7	10.7	1	2.4
Asian/Native Hawaiian/Pacific Islander	4	2.3	0	4	9.8
Another race	11	6.4	6.1	3	7.3
Region					
Mid-Atlantic	29	16.9	19.9	3	7.3
Midwest	36	20.9	24.4	4	9.8
Northeast	26	15.1	13.0	9	22.0
South	56	32.6	30.5	16	39.0
West	25	14.5	12.2	9	22.0
Social and economic					
Low family SES	93	54.1	55.0	21	51.2
Homeless ever	87	50.6	54.2	16	39.0
Sex work ever	77	44.8	50.4	11	26.8
Incarceration ever	67	39.0	45.8	7	17.1
Discrimination/stigma, last 30 days	136	79.1	76.3	36	87.8
Mental and behavioral health					
Depression (PHQ-2 positive screen score 3+ ^a)	64	37.2	38.2	14	34.2
Anxiety (GAD-7 positive screen score 10+ ^a)	69	40.1	37.4	20	48.8
Substance use (CRAFT positive screen score 2+ ^a)	112	65.1	62.6	30	73.2
Childhood history of violence ever experienced	87	50.6	52.7	18	43.9
Health care					
No health insurance	26	15.1	14.5	7	17.1
Medical gender affirmation hormones or surgery	89	51.7	47.3	27	65.9
Nonprescription hormone use ever (n = 87,60,27)	28	32.2	38.3	5	18.5
Barrier to health care—TG	32	18.6	13.7	14	34.2
Barrier to health care—cost	39	22.7	20.6	12	29.3

Statistically significant *p*-values ≤0.05 are bolded.

^aContinuous variables: bivariate *t*-test statistics. We tested for equality of variances and did not reject the null hypothesis that variances were equal; a pooled estimate for equal variances was utilized. Frequency and proportions: chi-square test statistics with degrees of freedom are presented.

CRAFT, CRAFT 6-item substance abuse screening test for adolescents; GAD-7, Generalized Anxiety Disorder 7-item scale; IQR, interquartile range; PHQ-2, Patient Health Questionnaire-2; SD, standard deviation; SES, socioeconomic status; TG, transgender.

TABLE 2. SEXUAL RISK IN TRANSGENDER AND OTHER GENDER MINORITY YOUTH (N=172): COMPARING TRANS FEMININE (N=131) AND TRANS MASCULINE (N=41) YOUTH

	Total sample (n = 172), 100.0%	Trans feminine (n = 131), 76.2%	Trans masculine (n = 41), 23.8%	Test statistic ^a	p
Sexual partners, last 6 months					
Total number of sexual partners, last 6 months					
Mean (SD)	7.17 (19.53)	7.75 (21.40)	4.97 (9.47)	-1.67	0.095
Median (IQR)	3.00 (5.00)	3.00 (5.00)	2.00 (4.00)		
Total number of HIV-negative or unknown sexual partners, last 6 months					
Mean (SD)	4.96 (14.32)	5.65 (16.17)	2.59 (2.74)	-0.95	0.341
Median (IQR)	2.00 (3.00)	2.00 (4.00)	2.00 (2.00)		
Total number of HIV-positive sexual partners, last 6 months					
Mean (SD)	1.22 (5.00)	1.54 (5.59)	0 (0)	-3.36	0.0008
Median (IQR)	0 (0)	0 (1.00)	0 (0)		
Gender of sexual partners, last 6 months, n (%)					
Cisgender (nontransgender) male	113 (65.7)	100 (76.3)	13 (31.7)	27.60 (1)	<0.0001
Cisgender female	28 (16.3)	11 (8.4)	17 (41.5)	25.05 (1)	<0.0001
Trans masculine (female-to-male)	12 (7.0)	5 (3.8)	7 (17.1)	^b	0.008
Transgender feminine (male-to-female)	11 (6.4)	9 (6.9)	2 (4.9)	^b	1.00
Sexual risk, last 6 months, n (%)					
Condomless receptive anal sex (n1 = 131, n2 = 41)	42 (24.4)	41 (31.3)	1 (2.4)	^b	<0.0001
Condomless receptive vaginal sex (n1 = 5, n2 = 41)	1 (2.2)	0 (0)	1 (2.4)	^b	1.00
Condomless receptive vaginal and/or anal sex	43 (25.0)	41 (31.3)	2 (4.9)	^b	0.0003
Condomless insertive anal sex (n1 = 126, n2 = 0)	36 (28.6)	36 (28.6)	0 (NA)	NA	NA
Condomless insertive vaginal sex (n1 = 126, n2 = 0)	1 (0.8)	1 (0.8)	0 (NA)	NA	NA
Condomless insertive vaginal and/or anal sex	36 (28.6)	36 (28.6)	NA (NA)	NA	NA
Binary sexual risk behavior, last 6 months, n (%)					
Any condomless receptive or insertive anal and/or vaginal sex	54 (31.4)	52 (39.7)	2 (4.9)	17.57 (1)	<0.0001

Statistically significant *p*-values ≤0.05 are bolded.

^aContinuous variables: Wilcoxon rank sum test statistics. *z* and *p*-value were presented. Frequency and proportions: chi-square test statistics with degrees of freedom are presented. Fisher's exact tests were used when sample size is small (expected counts <5 in any cell).

^bNo test statistic computed (exact probability was estimated).

IQR, interquartile range; n1, trans feminine who potentially could have engaged in this risk behavior; n2, trans masculine who could potentially have engaged in this behavior; NA, not applicable; SD, standard deviation.

70%, $\chi^2 = 3.00$, $p = 0.083$), although this difference was not statistically significant. TF living with HIV were more likely to have been diagnosed with an STI than TF without HIV (62% vs. 23%, $\chi^2 = 19.01$, $p < 0.0001$).

Condomless vaginal and/or anal sex in last 6 months

Univariable (unadjusted) and multivariable models regressing condomless vaginal and/or anal sex within the last 6 months (outcome) on demographic (Model 1), social and economic (Model 2), mental and behavioral health (Model 3), and health care (Model 4) factors were conducted (Table 4). TF youth had a 21.24-fold increased odds of engaging in condomless vaginal and/or anal sex compared to TM youth ($p = 0.0004$, Model 4). Individuals who received medical gender affirmation (e.g., hormones) had 4.52 greater odds of condomless vaginal and/or anal sex compared to individuals who did not receive medical gender affirmation ($p = 0.003$, Model 4). No other variables were statistically significant in the multivariable models.

Lifetime STI history

Univariate and multivariable models regressing STI history on demographic (Model 1), social and economic (Model 2), mental and behavioral health (Model 3), and health care (Model 4) factors were calculated (Table 5). TF youth had a 4.06-fold increased odds of STI history compared to TM youth ($p = 0.028$, Model 4). Binary youth were 21% as likely to have STI history compared to nonbinary youth ($p = 0.004$, Model 4). Youth who had ever engaged in sex work had a 3.00-fold increase in the odds of ever having had an STI diagnosis compared to individuals who never engaged in sex work ($p = 0.013$, Model 4). Youth who received medical gender affirmation had a 2.95-fold increased odds of STI history compared to youth who had not medically affirmed their gender ($p = 0.032$, Model 4).

Discussion

In this sample of diverse TGM 16–24 years of age, drawn from 14 US geographic locations, nearly one-third engaged

TABLE 3. HIV STATUS, AND SEXUALLY TRANSMITTED INFECTION (STI) SCREENING AND STI HISTORY OF TRANSGENDER AND OTHER GENDER MINORITY YOUTH ($N=172$): COMPARING TRANS FEMININE ($N=131$) AND TRANS MASCULINE ($N=41$) YOUTH

	<i>Total sample</i> ($n=172$), 100.0%	<i>Trans feminine</i> ($n=131$), 76.2%	<i>Trans masculine</i> ($n=41$), 23.8%	<i>Test statistic^a</i>	<i>p</i>
STI screening history, n (%)					
Ever STI screened	124 (72.1)	99 (75.6)	25 (61.0)	3.31 (1)	0.069
Number of times screened for STIs, n (%)	8.85 (19.57) 4.00 (5.00)	9.89 (21.70) 4.00 (5.00)	4.76 (4.79) 3.00 (3.00)	-1.02	0.308
Lifetime STI history, n (%)					
Yes	57 (33.1)	51 (38.9)	6 (14.6)	8.32 (1)	0.004
History of STI, n (%)	$N=58$	$N=51$	$N=7$		
Gonorrhea	27 (46.6)	26 (51.0)	1 (14.3)	0.0661	0.1083
Chlamydia	32 (55.2)	30 (58.8)	2 (28.6)	0.1085	0.2248
Syphilis	28 (48.3)	28 (54.9)	0 (0)	0.0068	0.0107
Herpes	3 (5.2)	2 (3.9)	1 (14.3)	0.2892	0.3251
HPV	10 (17.2)	10 (19.6)	0 (0)	0.2449	0.3356
Other	4 (7.0)	2 (3.9)	2 (33.3)	0.0484	0.0510
HIV infection, n (%)					
Yes	54 (31.4)	54 (41.2)	0 (0)	<0.0001	<0.0001

Statistically significant p -values ≤ 0.05 are bolded.

^aContinuous variables: bivariate t -test statistics. We tested for equality of variances and did not reject the null hypothesis that variances were equal; a pooled estimate for equal variances was utilized. Frequency and proportions: chi-square test statistics with degrees of freedom or Fisher's exact test are presented.

HPV, human papillomavirus; STI, sexually transmitted infection.

in condomless vaginal and/or anal sex in the previous 6 months and one-third ever had an STI in their lifetime. The prevalence and distribution of STI-related outcomes differed by gender identity (e.g., TF vs. TM, binary vs. nonbinary), medical gender affirmation, and sex work; however, no other demographic factors, social and economic issues, health care experiences, or mental and behavioral health conditions were associated with STI-related outcomes for TGMY in this study. Despite not being significantly associated with STI-related outcomes, the high burden of mental health conditions in this sample (depression, anxiety, substance use, and childhood violence) warrants future attention.

Although STIs are fundamental to HIV prevention and control,^{11,12} to our knowledge, these are some of the first national data on non-HIV STIs among TGMY across the United States to inform these efforts.³⁴ Early prevention, testing, and treatment are critical to averting the spread of STIs and avoiding future public health burden for TGMY and their sexual partners.³⁵ Our findings suggest that clinical epidemiology and care of TGMY must consider risk factors for STI-related outcomes for youth in general (e.g., sex work), alongside TG-specific factors unique to TGMY (e.g., medical gender affirmation) that may increase STI risk.

TF young people in this study faced pronounced disparities in STIs and sexual risk behaviors relative to TM, consistent with systematic reviews of TF adult populations.^{35,36} Syphilis was significantly more common in TF than TM youth in our sample, an STI that commonly co-occurs with HIV and increases transmissibility of infection.

Our results also show that a significantly higher proportion of TF than TM reported condomless receptive anal sex, the most efficient HIV transmission risk behavior. The need for gender validation by a sexual partner has been shown to make it difficult for TF adults to negotiate condom use with male

sex partners;²⁶ the same may be true for TF youth. Further, TF youth were more likely to report engaging in sex work, a known risk factor for STIs, than TM youth. Future research is needed to understand the mechanisms that cause and maintain TF young people's vulnerabilities for adverse STI-related outcomes, as well as to identify health-promoting and strength-based factors that can be levered for future interventions.

Although we found that a larger percentage of TF youth engaged in sexual risk behaviors and had a prior STI diagnosis than TM youth, and found higher absolute STI rates for TF young people, our findings show more than one in 10 TM had a history of STI and support the full inclusion of TM individuals in STI-related clinical care and research.³⁵ Lifetime STI prevalence was 389 per 1000 persons in TF youth and 146 per 1000 persons in TM youth. Moreover, with the exception of syphilis, TF and TM groups had similar rates of gonorrhea, chlamydia, herpes, and human papillomavirus.

A lower proportion of TM youth were STI screened than TF youth, emphasizing the need to reach more TM young people with STI screening. Of note, nearly one-third of TM youth reported a cisgender male sexual partner in the last 6 months. TM who have sex with cisgender males are an especially important youth subpopulation to monitor, given that sexual risk behaviors could augment rates of STIs in the future, given the high prevalence of these infections among some gay, bisexual, and other men who have sex with men networks.³⁷ Future research is needed to understand TM sexual development, partners, and practices to assess trajectories of risks and resiliencies over time.

Medical gender affirmation was associated with increased odds of both condomless sex in the last 6 months and STI history. This does not necessarily mean that medical gender affirmation is a risk factor for STIs. Those who have engaged in medical gender affirmation may have greater access to

sexual partners since medical interventions may increase the likelihood that partners will see them as gender typical versus atypical.

Further, some youth may be using sex work as a way to pay for medical affirmation, which can become a cycle of needing to do more sex work to get more medical gender affirmation. Some research suggests that TF adults are more likely to negotiate condom use or sexual safety, or engage in risky sex to feel affirmed in their gender and/or to have a sexual partner validate their gender identity.²⁶ TF adults may be willing to engage in riskier sexual behavior to achieve gender affirmation in relationships with cisgender male partners.^{38,39} No research has investigated how medical gender affirmation affects these negotiations with partners of level of sexual risk. More research is needed to examine gender affirmation in TF young people, including whether or not condoms themselves as a prevention technology are gender affirming.

In TM adults, social gender affirmation has been associated with STI history;⁴⁰ however, data are scarce on medical gender affirmation and STI-related outcomes. There may be periods of increased risk for TGMY surrounding medical gender affirmation (e.g., sensitive periods).⁴¹ It will be important to identify and understand these potential sensitive periods when sexual risk may be heightened for TGMY. Integrating and co-locating STI and other sexual health screenings with delivery of medical gender affirmation (e.g., hormones) will ensure routine sexual health screenings to meet national STI screening guidelines for youth.⁴²

A novel aspect of this study is our ability to compare STI-related outcomes for binary and nonbinary TGMY. On average, the effect of having a binary versus nonbinary gender identity was a 79% reduction in the odds of STIs. The higher odds of STI history conferred by a nonbinary identity found in this study of youth require replication.

Nonbinary youth are a heterogeneous group, especially within the developmental context of adolescence and young adulthood. Gender affirmation may look different for nonbinary youth or it may be a construct not at all relevant for them. Nonbinary youth may eschew gender norms. They may also experience pressure to conform to gender norms in sexual encounters, which may or may not be consistent with their internal sense of themselves as having aspects of both male and female, or neither male nor female. Nonbinary youth may not have a template or schema for negotiating sexual safety as nonbinary youth. They may not have thought that sex education in schools, often cisgender and heterosexually-focused, is relevant for them. More research is needed to determine why such an association was seen.

This study has several limitations. First, convenience sampling was utilized to recruit participants from 14 US cities. While participants represented a sample diverse in age, race, ethnicity, SES, gender identity, and HIV status, nonprobability-based sampling can lead to potential bias. The sample size obtained was also small for a national study, although it is one of the largest studies of TGMY sampled from the United States that we are aware of. Results from this study may not be generalizable to TGMY who live in other urban, rural, or small town areas. The study sample may have a greater lifetime STI diagnosis than the general population due to strong recruitment efforts from TG community members and ATMU study staff to reach a diverse sample of TGMY, an important strength of participatory collaboration with communities.

Due to feasibility, no STI biomarker data were collected during this study. Collection of STI biomarker data among TGMY should be prioritized in future research, as well as assessment of symptomatic and asymptomatic STIs. Some indicators, such as the prevalence of health care utilization, may be an underestimate due to being measured by self-report; however, social desirability bias was likely minimized due to the use of computer-assisted self-interviews.

Limitations exist with sexual risk data. Sexual risk was not disaggregated by sexual partners' HIV serostatus, which could mask a relationship that would help further understand STI risk factors. Residual confounding may exist due to a small sample size and the inability to adjust for all potential confounders in multivariable regression models. Additional research is needed to study how STI-related health outcomes relate to HIV outcomes, among TGMY specifically. Research is also needed to determine how rates of STIs compare between TGMY and all US young adults.

Limitations notwithstanding, this study is one of the first to characterize STI experiences in a sample of diverse and geographically dispersed US TGMY, including TF, TM, binary, and nonbinary youth, and has clinical implications. First, clinicians should be aware of the range of gender identities and expressions that their adolescent and young adult patients may embrace, and not make assumptions based on appearance. It is important to be cautious of umbrella terms like "transgender" since there are many specific identities within that general term. Medical literature often uses such "catch all" categories, which will miss the differences seen in this study between TF and TM youth, as well as binary versus nonbinary youth.

Second, clinicians should ask adolescent and young adult patients how they identify in terms of their gender identity and pronouns, and then use such terms and pronouns in their interactions. This is a crucial aspect of providing a gender affirming medical experience for TGMY.

Third, clinicians should conduct sexual histories that focus on descriptions of what anatomical "body parts" were placed where, by whom, and with whom during sexual encounters. They need to be cautious not to make assumptions about partner gender, sexual roles, positioning, and anatomical insertions/manipulations that occur during sexual activity.

Fourth, clinicians need to assess the lived experiences of their patients with regard to the various situated vulnerabilities explored, including demographic factors, social/economic issues, behavioral/mental health conditions, and health care experience. Clinicians should seek to "bundle" services for TGMY so that they can get access to needed services in one place; this could also be expanded to mental health and social services. The situated vulnerabilities surrounding STI risk and acquisition for TGMY—categories of demographic, social/economic issues, behavioral/mental health, and health care experience—necessitate further consideration. Differences in STI-related outcomes for TF versus TM youth and for nonbinary versus binary youth demonstrate the importance of not lumping TGMY into a single category.

Public health efforts that consider risk factors for STI-related outcomes for youth in general (e.g., sex work) alongside TG-specific risks that are unique to TGMY (e.g., medical gender affirmation) are needed. Early detection and treatment of STIs are essential to reduce transmission to others, as well as to avert or minimize long-term health-related sequelae.³ In

TABLE 4. UNIVARIATE AND MULTIVARIABLE MODELS: REGRESSING CONDOMLESS VAGINAL AND/OR ANAL SEX, LAST 6 MONTHS (BINARY OUTCOME), ON DEMOGRAPHICS, SOCIAL AND ECONOMIC, AND MENTAL AND BEHAVIORAL HEALTH, AND HEALTH CARE GROUPINGS, INCLUDING TRANS FEMININE (N=131) AND TRANS MASCULINE (N=41) YOUTH

	Univariate			Model 1			Model 2			Model 3			Model 4		
	aOR (95% CI)	p		aOR (95% CI)	p		aOR (95% CI)	p		aOR (95% CI)	p		aOR (95% CI)	p	
Demographic															
Age in years	1.13 (0.97–1.31)	0.1216		1.12 (0.95–1.31)	0.1873		1.08 (0.91–1.28)	0.4018		1.09 (0.91–1.31)	0.3453		1.09 (0.9–1.32)	0.3870	
Trans feminine vs. trans masculine	12.83 (2.97–55.41)	0.0006		12.69 (2.82–57.06)	0.0009		10.91 (2.38–49.98)	0.0021		12.04 (2.58–56.3)	0.0016		21.24 (3.94–114.67)	0.0004	
Binary vs. nonbinary	1.08 (0.51–2.27)	0.8496		0.89 (0.38–2.1)	0.7940		1.05 (0.43–2.58)	0.9157		1.1 (0.44–2.74)	0.8360		0.49 (0.16–1.44)	0.1938	
Latino vs. not	1.40 (0.70–2.82)	0.3419		2.09 (0.86–5.1)	0.1041		1.92 (0.75–4.91)	0.1712		1.98 (0.77–5.15)	0.1586		1.61 (0.59–4.39)	0.3488	
Youth of color vs. white	1.86 (0.89–3.93)	0.1015		1.39 (0.57–3.38)	0.4655		1.37 (0.54–3.49)	0.5117		1.47 (0.57–3.8)	0.4289		1.39 (0.52–3.7)	0.5097	
Region															
Mid-Atlantic vs. West	2.24 (0.69–7.26)	0.1810		1.91 (0.48–7.66)	0.3601		1.75 (0.41–7.52)	0.4552		1.96 (0.44–8.87)	0.3801		2.79 (0.58–13.46)	0.2021	
Midwest vs. West	1.58 (0.50–5.00)	0.4337		1.13 (0.3–4.24)	0.8591		0.92 (0.23–3.71)	0.9110		0.98 (0.23–4.09)	0.9762		1.26 (0.28–5.63)	0.7644	
Northeast vs. West	1.41 (0.41–4.86)	0.5891		1.38 (0.34–5.6)	0.6508		1.44 (0.33–6.25)	0.6235		1.45 (0.33–6.39)	0.6201		2.46 (0.51–11.98)	0.2648	
South vs. West	1.27 (0.43–3.75)	0.6698		1.35 (0.38–4.77)	0.6418		1.31 (0.35–4.91)	0.6843		1.25 (0.33–4.79)	0.7411		2.08 (0.5–8.66)	0.3137	
Social and economic															
Sex work ever	2.97 (1.52–5.78)	0.0014		—	—		1.74 (0.81–3.74)	0.1561		1.47 (0.65–3.35)	0.3564		1.43 (0.6–3.38)	0.4183	
Incarceration ever	2.74 (1.41–5.31)	0.0029		—	—		1.88 (0.88–4.01)	0.1024		1.88 (0.86–4.14)	0.1158		2.04 (0.89–4.68)	0.0923	
Discrimination/stigma, last 30 days	1.79 (0.76–4.24)	0.1862		—	—		2.33 (0.9–6.05)	0.0829		2.17 (0.81–5.85)	0.1256		1.93 (0.69–5.45)	0.2120	
Mental and behavioral health															
Depression (PHQ-2)	1.39 (0.72–2.69)	0.3239		—	—		—	—		0.66 (0.23–1.89)	0.4393		0.85 (0.29–2.52)	0.7676	
Anxiety (GAD-7)	1.45 (0.76–2.78)	0.2643		—	—		—	—		1.89 (0.66–5.39)	0.2351		1.87 (0.62–5.67)	0.2690	
Substance use (CRAFFT)	1.41 (0.71–2.82)	0.3291		—	—		—	—		1.38 (0.6–3.19)	0.4506		1.66 (0.68–4.02)	0.2646	
Childhood history of violence experienced	1.67 (0.87–3.20)	0.1251		—	—		—	—		1.35 (0.63–2.92)	0.4450		1.34 (0.59–3.01)	0.4832	
Health care															
No health insurance	0.97 (0.39–2.38)	0.9407		—	—		—	—		—	—		1.08 (0.33–3.49)	0.9045	
Medical gender affirmation	1.74 (0.90–3.35)	0.0979		—	—		—	—		—	—		4.52 (1.65–12.35)	0.0031	
Barrier to health care—transgender	1.18 (0.52–2.66)	0.6875		—	—		—	—		—	—		1.08 (0.34–3.43)	0.8913	
AIC	—	—		206.138			202.233			207.465			203.465		
–2.1BogL	—	—		186.138			176.233			173.465			163.465		
Likelihood ratio test	—	—		—			Model 2 vs. Model 1			Model 3 vs. Model 2			Model 4 vs. Model 3		
Chi-square (<i>p</i> -value)	—	—		—			9.9052 (0.0194)			2.7680 (0.5974)			10.0001 (0.0186)		

Statistically significant *p*-values ≤0.05 are bolded. Note: (1) Model 1: demographic, (2) Model 2: Model 1 + social and economic, (3) Model 3: Model 2 + mental and behavioral health, (4) Model 4: Model 3 + health care.

AIC, Akaike information criterion; aOR, adjusted odds ratio; CI, confidence interval; CRAFFT, CRAFFT 6-item substance abuse screening test for adolescents; GAD-7, Generalized Anxiety Disorder 7-item scale; PHQ-2, Patient Health Questionnaire-2.

TABLE 5. UNIVARIATE AND MULTIVARIABLE MODELS: REGRESSING SEXUALLY TRANSMITTED INFECTION HISTORY ON DEMOGRAPHICS, SOCIAL AND ECONOMIC, AND MENTAL AND BEHAVIORAL HEALTH AND HEALTH CARE GROUPINGS, INCLUDING TRANS FEMINE (N=131) AND TRANS MASCULINE (N=41) YOUTH

	Univariate			Model 1			Model 2			Model 3			Model 4		
	aOR (95% CI)	p		aOR (95% CI)	p		aOR (95% CI)	p		aOR (95% CI)	p		aOR (95% CI)	p	
Demographic															
Age in years	1.16 (1.00–1.35)	0.0508		1.17 (0.99–1.39)	0.0608		1.13 (0.95–1.35)	0.1688		1.13 (0.94–1.36)	0.2099		1.13 (0.93–1.36)	0.2220	
Trans feminine vs. trans masculine	3.72 (1.46–9.47)	0.0059		3.47 (1.24–9.70)	0.0179		2.67 (0.90–7.93)	0.0767		3.01 (0.97–9.30)	0.0556		4.06 (1.17–14.18)	0.0279	
Binary vs. nonbinary	0.46 (0.23–0.94)	0.0334		0.38 (0.17–0.85)	0.0188		0.38 (0.16–0.9)	0.0281		0.35 (0.14–0.86)	0.0227		0.21 (0.07–0.62)	0.0044	
Latino vs. not	1.10 (0.55–2.22)	0.7846		1.82 (0.76–4.37)	0.1823		1.48 (0.59–3.75)	0.4063		1.50 (0.58–3.85)	0.4015		1.14 (0.43–3.08)	0.7904	
Youth of color vs. white	2.81 (1.29–6.12)	0.0095		1.98 (0.82–4.83)	0.1311		2.13 (0.82–5.52)	0.1204		2.16 (0.82–5.71)	0.1211		1.95 (0.72–5.29)	0.1883	
Region															
Mid-Atlantic vs. West	4.27 (1.17–15.58)	0.0282		4.30 (0.96–19.24)	0.0565		3.47 (0.73–16.48)	0.1182		3.36 (0.66–17.17)	0.1449		4.1 (0.77–21.77)	0.0972	
Midwest vs. West	3.34 (0.95–11.80)	0.0610		2.53 (0.62–10.43)	0.1978		1.89 (0.43–8.26)	0.3953		1.81 (0.39–8.40)	0.4476		2.02 (0.42–9.74)	0.3813	
Northeast vs. West	1.58 (0.39–6.42)	0.5265		1.77 (0.39–8.05)	0.4613		1.73 (0.36–8.41)	0.4696		1.91 (0.38–9.70)	0.4338		2.65 (0.49–14.23)	0.2571	
South vs. West	2.92 (0.88–9.69)	0.0806		2.77 (0.71–10.8)	0.1425		2.38 (0.58–9.76)	0.2275		2.64 (0.61–11.37)	0.1932		3.31 (0.73–15.16)	0.1224	
Social and economic															
Sex work ever	4.39 (2.22–8.67)	<0.0001		—	—		2.96 (1.38–6.31)	0.0051		0.34 (0.15–0.78)	0.0112		3.00 (1.26–7.12)	0.0128	
Incarceration ever	2.62 (1.36–5.03)	0.0039		—	—		1.75 (0.82–3.71)	0.1483		0.59 (0.27–1.29)	0.1875		1.70 (0.75–3.82)	0.2021	
Discrimination/stigma, last 30 days	1.64 (0.71–3.76)	0.3464		—	—		1.50 (0.59–3.84)	0.3996		0.61 (0.23–1.64)	0.3287		1.58 (0.57–4.35)	0.3754	
Mental and behavioral health															
Depression (PHQ-2)	1.36 (0.71–2.62)	0.3504		—	—		—	—		0.63 (0.23–1.72)	0.3663		1.78 (0.62–5.12)	0.2879	
Anxiety (GAD-7)	0.81 (0.42–1.57)	0.5376		—	—		—	—		2.22 (0.79–6.26)	0.1321		0.52 (0.17–1.59)	0.2517	
Substance use (CRAFFT)	2.05 (1.01–4.16)	0.0476		—	—		—	—		0.60 (0.25–1.42)	0.2400		1.82 (0.73–4.49)	0.1969	
Childhood history of violence experienced	1.02 (0.54–1.92)	0.9564		—	—		—	—		0.85 (0.29–2.52)	0.3803		0.73 (0.32–1.65)	0.4442	
Health care															
No health insurance	1.92 (0.83–4.49)	0.1301		—	—		—	—		—	—		1.40 (0.47–4.17)	0.5443	
Medical gender affirmation	0.95 (0.50–1.79)	0.8727		—	—		—	—		—	—		2.95 (1.10–7.89)	0.0316	
Barrier to health care—transgender	0.62 (0.26–1.48)	0.2814		—	—		—	—		—	—		0.57 (0.18–1.86)	0.3535	
AIC	—	—		210.510	—		202.837	—		206.064	—		206.746	—	
–2 logL	—	—		190.510	—		176.837	—		172.064	—		166.746	—	
Likelihood ratio test	—	—		—	—		Model 2 vs. Model 1	—		Model 3 vs. Model 2	—		Model 4 vs. Model 3	—	
Chi-square (p-value)	—	—		—	—		13.6727 (0.0034)	—		4.7733 (0.3114)	—		5.3184 (0.1499)	—	

Statistically significant p -values ≤ 0.05 are bolded. Note: (1) Model 1: demographic, (2) Model 2: Model 1 + social and economic, (3) Model 3: Model 2 + mental and behavioral health, (4) Model 4: Model 3 + health care.
AIC, Akaike information criterion; aOR, adjusted odds ratio; CI, confidence interval; CRAFFT, CRAFFT 6-item substance abuse screening test for adolescents; GAD-7, Generalized Anxiety Disorder 7-item scale; PHQ-2, Patient Health Questionnaire-2.

addition, biomedical HIV prevention strategies, such as pre-exposure prophylaxis, do not protect against other STIs, which means it will be important to monitor STIs among TGMY alongside biomedical HIV prevention uptake. This study finds that TGMY are vulnerable to STIs and in need of public health attention.

The CDC does not currently suggest best STI screening practices for gender minority people in the United States, or specifically TGMY, but does recommend that health care providers “assess STD- and HIV-related risks for their TG patients based on current anatomy and sexual behaviors.”^{43(p.17)} Recommendations for screening are based on epidemiological and clinical data; therefore, this study fills a key gap in existing adolescent and young adult sexual health research by providing STI-related outcome data for TGMY.

Integrated and co-located primary care, including screening, diagnosis, and treatment of STIs and sexual health services that are gender affirming, represents an important model of health care delivery for TGMY. Interventions and research are needed to aid health care providers in promoting gender-affirming STI and HIV prevention methods, such as STI education that does not conflate gender identity with specific bioanatomy or sexual behaviors.

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References

- Centers for Disease Control and Prevention (CDC). Sexually Transmitted Disease Surveillance 2016. Available at: www.cdc.gov/std/stats16/CDC_2016_STDS_Report-for508WebSep21_2017_1644.pdf (Last accessed November 18, 2018).
- Grieb SM, Reddy M, Griffin B, et al. Identifying solutions to improve the sexually transmitted infections testing experience for youth through participatory ideation. *AIDS Patient Care STDS* 2018;32:330–335.
- American Academy of Pediatrics, Committee on Adolescence, Society for Adolescent Health and Medicine. Policy Statement: Screening for nonviral sexually transmitted infections in adolescents and young adults. *Pediatrics* 2014; 134:e302–e311.
- Reisner SL, Vettes R, White JM, et al. Laboratory-confirmed HIV and sexually transmitted infection seropositivity and risk behavior among sexually active transgender patients at an adolescent and young adult urban community health center. *AIDS Care* 2015;27:1031–1036.
- Bauermeister JA, Goldenberg T, Connolly D, et al. Psychosocial disparities among racial/ethnic minority transgender young adults and young men who have sex with men living in Detroit. *Transgend Health* 2016;1:279–290.
- Reisner SL, Bradford J, Hopwood R, et al. Comprehensive transgender healthcare: The gender affirming clinical and public health model of Fenway Health. *J Urban Health* 2015;92:584–592.
- Garofalo R, Deleon J, Osmer E, et al. Overlooked, misunderstood and at-risk: Exploring the lives and HIV risk of ethnic minority male-to-female transgender youth. *J Adolesc Health* 2006;38:230–236.
- Brennan J, Kuhns LM, Johnson AK, et al. Syndemic theory and HIV-related risk among young transgender women: The role of multiple, co-occurring health problems and social marginalization. *Am J Public Health* 2012;102: 1751–1757.
- Wilson EC, Garofalo R, Harris DR, Belzer M. Sexual risk taking among transgender male-to-female youths with different partner types. *Am J Public Health* 2010;100:1500–1505.
- Wilson EC, Chen YH, Arayasirikul S, et al. Differential HIV risk for racial/ethnic minority trans* female youth and socio-economic disparities in housing, residential stability and education. *Am J Public Health* 2015;105:e41–e47.
- Medland NA, McMahon JH, Chow EP, et al. The HIV care cascade: A systematic review of data sources, methodology and comparability. *J Int AIDS Soc* 2015;18:20634.
- Zanoni BC, Mayer KH. The adolescent and young adult HIV cascade of care in the United States: Exaggerated

- health disparities. *AIDS Patient Care STDS* 2014;28:128–135.
13. Clark H, Babu AS, Wiewel EW, et al. Diagnosed HIV infection in transgender adults and adolescents: Results from the National HIV Surveillance System, 2009–2014. *AIDS Behav* 2017;21:2774–2783.
 14. Mitchell KJ, Ybarra ML, Korchmaros JD. Sexual harassment among adolescents of different sexual orientations and gender identities. *Child Abuse Neglect* 2014;38:280–295.
 15. Reisner SL, Vettes R, Leclerc M, et al. Mental health of transgender youth in care at an adolescent urban community health center: A matched retrospective cohort study. *J Adolesc Health* 2015;56:274–279.
 16. Veale JF, Peter T, Travers R, Saewyc EM. Enacted stigma, mental health, and protective factors among transgender youth in Canada. *Transgend Health* 2017;2:207–216.
 17. Reisner SL, Biello KB, White Hughto JM, et al. Psychiatric diagnoses and comorbidities in a diverse, multicity cohort of young transgender women: Baseline findings from project LifeSkills. *JAMA Pediatr* 2016;170:481–486.
 18. Clark BA, Veale JF, Greyson D, Saewyc E. Primary care access and foregone care: A survey of transgender adolescents and young adults. *Fam Pract* 2018;35:302–306.
 19. Rowe C, Santos GM, McFarland W, Wilson EC. Prevalence and correlates of substance use among trans female youth ages 16–24 years in the San Francisco Bay Area. *Drug Alcohol Depend* 2015;147:160–166.
 20. Lefkowitz AR, Mannell J. Sexual health service providers' perceptions of transgender youth in England. *Health Soc Care Community* 2017;25:1237–1246.
 21. Radix A, Silva M. Beyond the guidelines: Challenges, controversies, and unanswered questions. *Pediatr Ann* 2014;43:e145–e150.
 22. Reisner SL, Poteat T, Keatley J, et al. Global health burden and needs of transgender populations: A review. *Lancet* 2016;388:412–436.
 23. Reisner SL, Conron KJ, Tardiff LA, et al. Monitoring the health of transgender and other gender minority populations: Validity of natal sex and gender identity survey items in a U.S. national cohort of young adults. *BMC Public Health* 2014;14:1224.
 24. Reisner S, Keatley J, Baral S, et al. Transgender community voices: A participatory population perspective. *Lancet* 2016;388:327–330.
 25. Bockting WO, Miner MH, Swinburne Romine RE, et al. Stigma, mental health, and resilience in an online sample of the US transgender population. *Am J Public Health* 2013;103:943–951.
 26. Sevelius JM. Gender affirmation: A framework for conceptualizing risk behavior among transgender women of color. *Sex Roles* 2013;68:675–689.
 27. Operario D, Nemoto T. HIV in transgender communities: Syndemic dynamics and a need for multicomponent interventions. *J Acquir Immune Defic Syndr* 2010;55(Suppl. 2):S91–S93.
 28. National Institutes of Health (NIH). Adolescent Medicine Trials Network for HIV/AIDS Interventions (ATN). Available at: www.nichd.nih.gov/research/supported/Pages/atn.aspx (Last accessed December 7, 2016).
 29. Reisner SL, Jadwin-Cakmak L, White Hughto JM, et al. Characterizing the HIV Prevention and care continua in a sample of transgender youth in the U.S. *AIDS Behav* 2017;21:3312–3327.
 30. Bastos JL, Celeste RK, Faerstein E, Barros AJ. Racial discrimination and health: A systematic review of scales with a focus on their psychometric properties. *Soc Sci Med* 2010;70:1091–1099.
 31. Spitzer RL, Kroenke K, Williams JB, Lowe B. A brief measure for assessing generalized anxiety disorder: The GAD-7. *Arch Intern Med* 2006;166:1092–1097.
 32. Knight JR, Sherritt L, Harris SK, et al. Validity of brief alcohol screening tests among adolescents: A comparison of the AUDIT, POSIT, CAGE, and CRAFFT. *Alcohol Clin Exp Res* 2003;27:67–73.
 33. Knight JR, Sherritt L, Shrier LA, et al. Validity of the CRAFFT substance abuse screening test among adolescent clinic patients. *Arch Pediatr Adolesc Med* 2002;156:607–614.
 34. Schulden JD, Song B, Barros A, et al. Rapid HIV testing in transgender communities by community-based organizations in three cities. *Public Health Rep* 2008;123(Suppl. 3):101–114.
 35. Poteat T, Scheim A, Xavier J, et al. Global epidemiology of HIV infection and related syndemics affecting transgender people. *J Acquir Immune Defic Syndr* 2016;72(Suppl. 3):S210–S219.
 36. Baral SD, Poteat T, Stromdahl S, et al. Worldwide burden of HIV in transgender women: A systematic review and meta-analysis. *Lancet Infect Dis* 2013;13:214–222.
 37. Reisner SL, Perkovich B, Mimiaga MJ. A mixed methods study of the sexual health needs of New England transmen who have sex with nontransgender men. *AIDS Patient Care STDS* 2010;24:501–513.
 38. Glynn TR, Gamarel KE, Kahler CW, et al. The role of gender affirmation in psychological well-being among transgender women. *Psychol Sex Orientat Gend Divers* 2016;3:336–344.
 39. Sevelius J. “There’s no pamphlet for the kind of sex I have”: HIV-related risk factors and protective behaviors among transgender men who have sex with nontransgender men. *J Assoc Nurses AIDS Care* 2009;20:398–410.
 40. Reisner SL, White Hughto JM, Pardee D, Sevelius J. Syndemics and gender affirmation: HIV sexual risk in female-to-male trans masculine adults reporting sexual contact with cisgender males. *Int J STD AIDS* 2016;27:955–966.
 41. Kuh D, Ben-Shlomo Y, Lynch J, et al. Life course epidemiology. *J Epidemiol Community Health* 2003;57:778–783.
 42. Lee KC, Ngo-Metzger Q, Wolff T, et al. Sexually transmitted infections: Recommendations from the U.S. Preventive Services Task Force. *Am Fam Physician* 2016;94:907–915.
 43. U.S. Department of Health and Human Services CfDCAPC. Sexually transmitted diseases treatment guidelines, 2015. *MMWR* 2015;64:1–138.

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