Pregnancy intentions and outcomes among transgender, nonbinary, and gender-expansive people assigned female or intersex at birth in the United States: Results from a national, quantitative survey

Heidi Moseson, Laura Fix, Jen Hastings, Ari Stoeffler, Mitchell R. Lunn, Annessa Flentje, Micah E. Lubensky, Matthew R. Capriott, Sachiko Ragosta, Hannah Forsberg and Juno Obedin-Maliver

ABSTRACT

Background: Transgender, nonbinary, and gender-expansive (TGE) people experience pregnancy. Quantitative data about pregnancy intentions and outcomes of TGE people are needed to identify patterns in pregnancy intentions and outcomes and to inform clinicians how best to provide gender-affirming and competent pregnancy care.

Aims: We sought to collect data on pregnancy intentions and outcomes among TGE people assigned female or intersex at birth in the United States.

Methods: Collaboratively with a study-specific community advisory team, we designed a customizable, online survey to measure sexual and reproductive health experiences among TGE people. Eligible participants included survey respondents who identified as a man or within the umbrella of transgender, nonbinary, or gender-expansive identities; were 18 years or older; able to complete an electronic survey in English; lived in the United States; and were assigned female or intersex at birth. Participants were recruited through The PRIDE Study – a national, online, longitudinal cohort study of sexual and gender minority people – and externally via online social media postings, TGE community e-mail distribution lists, in-person TGE community events, and academic and community conferences. We conducted descriptive analyses of pregnancy-related outcomes and report frequencies overall and by racial and ethnic identity, pregnancy intention, or testosterone use.

Results: Out of 1,694 eligible TGE respondents who provided reproductive history data, 210 (12%) had been pregnant. Of these, 115 (55%) had one prior pregnancy, 47 (22%) had two prior pregnancies, and 48 (23%) had three or more prior pregnancies. Of the 433 pregnancies, 169 (39%) resulted in live birth, 142 (33%) miscarried, 92 (21%) ended in abortion, two (0.5%) ended in stillbirth, two (0.5%) had an ectopic pregnancy, and seven (2%) were still pregnant; nineteen pregnancies (4%) had an unknown outcome. Among live births, 39 (23%) were delivered via cesarean section. Across all pregnancies, 233 (54%) were unintended. Fifteen pregnancies occurred after initiation of testosterone, and four pregnancies occurred while taking testosterone. Among all participants, 186 (11%) wanted a future pregnancy, and 275 (16%) were unsure; 182 (11%) felt “at risk” for an unintended pregnancy.

Discussion: TGE people in the United States plan for pregnancy, experience pregnancy (intended and unintended) and all pregnancy outcomes, and are engaged in family building. Sexual and reproductive health clinicians and counselors should avoid assumptions about pregnancy capacity or intentions based on a patient’s presumed or stated gender or engagement with gender-affirming hormone therapy.

KEYWORDS

abortion; birth; intersex; miscarriage; nonbinary; pregnancy; testosterone; transgender

CONTACT Heidi Moseson hmoseson@ibisreproductivehealth.org Ibis Reproductive Health, 1736 Franklin Street, Suite 600, Oakland, CA 94116, USA.

© 2020 The Author(s). Published with license by Taylor & Francis Group, LLC. This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (http://creativecommons.org/licenses/by-nc-nd/4.0/), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way.
Introduction

Transgender, nonbinary, and gender-expansive (TGE) people (i.e., individuals whose gender identity differs from the gender identity commonly assumed for the sex assigned to them at birth) who were assigned female sex at birth often retain a uterus and may carry pregnancies (Cipres et al., 2017; Fein et al., 2019; Light et al., 2018, 2014; Obedin-Maliver & Makadon, 2016). People assigned intersex at birth or who identify as intersex are those who have “natural variations in sex characteristics that do not seem to fit typical binary notions of male or female bodies” (InterAct Advocates for Intersex Youth & Lambda Legal, 2018). Such variations do not necessarily impact capacity for pregnancy, although some irreversible surgeries completed on children diagnosed as intersex may impair fertility (Human Rights Watch & InterAct Advocates for Intersex Youth, 2017). Despite the fact that individuals from both of these groups can and do carry pregnancies, TGE and intersex people have been excluded from sexual and reproductive health research. Almost all prior research has focused on pregnancies solely among cisgender women (i.e., people whose gender identity aligns with the gender identity commonly assumed for those assigned female sex at birth) (Moseson et al., 2020), which presents a narrow view of reproductive health and family building.

Despite the ability to carry pregnancies, TGE people assigned female sex at birth face barriers to accessing high-quality gynecological and obstetrical care (Hoffkling et al., 2017; Light et al., 2014; 2018). Participants in qualitative research on the pregnancy experiences of TGE individuals have also reported negotiating tensions between their fertility or family building intentions and their desire for gender-affirming hormone therapy, which can be exacerbated by the lack of research on testosterone use during pregnancy (Ellis et al., 2015; Hahn et al., 2019; Hoffkling et al., 2017; Light et al., 2014; 2018; Pearce & White, 2019). These studies serve as resources for clinicians and healthcare providers and form the basis of the few clinical recommendations that exist about pregnancy-related care for TGE people (Dutton et al., 2008; Makadon et al., 2015; Obedin-Maliver & Makadon, 2016).

However, further research with larger study samples is needed to build the evidence base for essential reproductive health outcomes including unintended pregnancies, abortion experiences, and fertility experiences (Fein et al., 2019; Light et al., 2018; Obedin-Maliver & Makadon, 2016) and to inform revisions to existing guidelines. Generating evidence among larger samples is vital to gain a more precise understanding of the incidence, prevalence, and patterns of these health experiences and to inform healthcare provider education with evidence-based and culturally competent care for these populations. Toward this goal, we collected data on pregnancy...
intentions and outcomes among a large sample of TGE people assigned female or intersex at birth in the United States.

**Methods**

**Ethics**

This study was reviewed and approved by the Institutional Review Boards of Stanford University and the University of California, San Francisco. In addition, The Population Research in Identity and Disparities for Equality (PRIDE) Study Research Advisory Committee and The PRIDE Study Participant Advisory Committee (pridestudy.org/pridenet) reviewed and approved the study. We obtained informed consent from all survey respondents. The study protocol followed all guidelines and precautions recommended for research involving a vulnerable population, which for this research included pregnant persons. The study was designed by a research team that included TGE individuals and in close collaboration with a paid, study-specific community advisory team comprised of five TGE individuals.

**Study design**

This study was a self-administered, online, cross-sectional survey of sexual and reproductive health experiences, designed specifically for sexual and gender minority participants. There were two enrollment avenues: an online anonymous survey or through participation in The PRIDE Study. For the anonymous online survey, eligible participants included those who were 18-45 years old; were transgender, nonbinary, or gender-expansive; assigned female or intersex at birth; resided in the United States; and could complete an electronic survey in English. We recruited individuals through social media posts, outreach to community-based organizations, e-mail distribution lists, in-person TGE community events, flyers at academic and community conferences, and a standalone study website. Sexual and gender minority individuals assigned female or intersex at birth and age 18 years or older could participate through The PRIDE Study, a longitudinal cohort study of people who identify as lesbian, gay, bisexual, transgender, queer (LGBTQ+), or as a sexual or gender minority in the United States (pridestudy.org).

**Data collection**

We co-created this Qualtrics-based (Qualtrics, Provo, UT) survey with a community advisory team as well as The PRIDE Study’s Research and Participant Advisory Committees. We programmed the survey to allow for customizable words for sexual and reproductive body parts and processes to reduce gender dysphoria. We utilized skip logic to increase question relevance for individual respondents and to reduce survey length. Respondents who initiated the survey were entered into a raffle to win one of 100, $50 electronic gift cards. Survey development, content, and format details are described elsewhere (Moseson et al., 2020).

The survey focused on core domains related to gender identity, sexual activity, and sexual and reproductive health. The primary outcome for this analysis was gravidity, including a current pregnancy. Secondary outcomes were: testosterone use in relation to pregnancy, pregnancy intention, pregnancy outcomes (ongoing pregnancy, miscarriage, ectopic pregnancy, abortion, stillbirth, live-birth, unknown), and delivery method. Additional survey questions asked about future pregnancy intentions, desired timing for future pregnancy, and whether the respondent felt “at risk” of unintended pregnancy (defined as getting pregnant at a time that they did not want to be pregnant).

**Measures**

For pregnancy-related outcomes, we developed an indicator of “ever pregnant” based on whether a respondent reported “one or more” or zero pregnancies. Currently pregnant respondents were classified as “ever pregnant.” The survey collected detailed information on timing, intention, and outcome of each pregnancy as well as testosterone use. We classified respondents as intending to get pregnant in the future, and the timing of those pregnancy plans, based on responses to modified Pregnancy Attitudes
Timing and How (PATH) questions (Callegari et al., 2017).

We included sociodemographic measures. To identify which survey respondents met the study eligibility criteria of being transgender, nonbinary, or gender-expansive, we categorized respondents based on three questions: (1) an open-text response question asking respondents to describe their gender identity, (2) a multiple choice question asking them to pick all options that best reflected their gender identity and an “additional” write-in option if they did not feel represented by the available options, and (3) a sex assigned at birth multiple choice question that included the options “female,” “male,” “not listed” (with a write-in response), and “prefer not to say.” We categorized respondents as TGE if their categorical or free text responses included any genders other than “cisgender woman” and/or “woman” (see Table 1 for full list of gender identity options). We categorized participants as intersex if they (1) reported an intersex assignment at birth in their open-text response to the sex assigned at birth question, or (2) if they indicated that they identified as intersex in a subsequent question specific to intersex identity (even if they reported having been female sex assigned at birth). To measure race/ethnicity and sexual orientation, respondents could select all that apply (including a write-in response) from a list of ten racial and ethnic identities and a list of ten sexual orientations.

**Analytic approach**

We conducted descriptive analyses to closed-ended survey questions using Stata 15.1 (StataCorp, College Station, TX). We calculated outcome frequencies overall and by pregnancy intention status, history of testosterone use, and racial/ethnic identity category (American Indian and Alaska Native, Asian, Black or African American, Hispanic or Latinx, Middle Eastern or North African, Native Hawaiian and other Pacific Islander, white, and additionally, a category for anyone who selected two or more racial identities). We tested for a difference in proportion of pregnancies reported as unintended between respondents who reported ever using testosterone versus those who reported never using testosterone using a two-tailed test of proportions.

**Results**

**Participant characteristics**

Out of 1,694 TGE respondents, approximately one in four (n = 469, 28%) reported ever using testosterone (any formulation), and 210 (12%) reported ever having been pregnant (Table 1). Among these 210 respondents, median age was 35 years (IQR: 29-42); 56% reported more than one gender identity [most commonly nonbinary (52%)]; 99% reported having been assigned female sex at birth, 0.5% reported being assigned “both” sexes at birth, and 0.5% reporting being diagnosed intersex at birth but assigned female; 6% identified as intersex. A minority of ever-pregnant respondents (28%) identified with a racial or ethnic identity other than “white,” and most had health insurance (91%). Over half of ever-pregnant participants (54%) were parents to at least one child.

**Pregnancy history and use of testosterone**

Among the 210 ever-pregnant participants, 115 (55%) had been pregnant a single time, while 95 (45%) had been pregnant 2 to 13 times (Table 2). Seven (3%) of the ever-pregnant participants were pregnant at the time of the survey. In the past twelve months, 16 respondents reported a pregnancy, or 1% of the sample as a whole (n = 1,694). To more precisely estimate the pregnancy rate among respondents likely capable of pregnancy, we excluded respondents who reported a hysterectomy (n = 175), that they do not have sex where sperm is released in or near the vagina (n = 607), and/or were 45 years or older (n = 107), leaving 16 pregnancies among 955 respondents (1.7%). This translates to an approximate pregnancy rate of 16.8 pregnancies per 1,000 TGE respondents with a uterus who have sex that can lead to pregnancy, per year.

Among respondents who had ever used testosterone, 10% (n = 46) reported ever being pregnant compared to 13% (n = 164) who reported never using testosterone. Twelve respondents reported 15 pregnancies that occurred after
Table 1. Respondent sociodemographic characteristics, overall and by pregnancy history among an online sample of transgender, nonbinary, and gender-expansive individuals assigned female or intersex at birth in the United States (n = 1,694).

| Sample Characteristics                                      | All Respondents (n = 1,694) | Respondents who reported ever having had a pregnancy (n = 210) |
|-------------------------------------------------------------|-----------------------------|---------------------------------------------------------------|
| **Median age in years, IQR**                                | 27 (23-33)                  | 35 (29-42)                                                   |
| **Age categories**                                          |                             |                                                              |
| 18-19 y                                                    | 150 (9)                     | 3 (1)                                                        |
| 20-24 y                                                    | 469 (28)                    | 21 (10)                                                      |
| 25-29 y                                                    | 447 (26)                    | 38 (18)                                                      |
| 30-34 y                                                    | 284 (17)                    | 44 (21)                                                      |
| 35-39 y                                                    | 149 (9)                     | 39 (19)                                                      |
| 40-44 y                                                    | 88 (5)                      | 28 (13)                                                      |
| 45-49 y                                                    | 38 (2)                      | 13 (6)                                                       |
| 50-54 y                                                    | 31 (2)                      | 10 (5)                                                       |
| 55-59 y                                                    | 20 (1)                      | 5 (2)                                                        |
| 60-78 y                                                    | 18 (1)                      | 9 (4)                                                        |
| **Gender identities**                                      |                             |                                                              |
| Agender                                                    | 226 (13)                    | 34 (16)                                                      |
| Cisgender man                                              | 1 (0)                       | 1 (1)                                                        |
| Cisgender woman                                            | 0 (0)                       | 17 (8)                                                       |
| Genderqueer                                                | 655 (39)                    | 95 (45)                                                      |
| Man                                                        | 293 (17)                    | 19 (9)                                                       |
| Nonbinary                                                  | 868 (51)                    | 110 (52)                                                     |
| Transgender man                                            | 662 (39)                    | 70 (33)                                                      |
| Transgender woman                                          | 4 (0)                       | 1 (1)                                                        |
| Two-spirit                                                  | 26 (2)                      | 9 (4)                                                        |
| Woman                                                      | 204 (12)                    | 20 (10)                                                      |
| Additional gender identity                                 | 197 (12)                    | 24 (11)                                                      |
| Multiple gender identities                                 | 1036 (61)                   | 118 (56)                                                     |
| Prefer not to say                                          | 2 (0)                       | 1 (1)                                                        |
| Missing                                                    | 0 (0)                       | 0 (0)                                                        |
| **Sex assigned at birth**                                  |                             |                                                              |
| Female                                                     | 1684 (99)                   | 208 (99)                                                     |
| Not listed                                                 | 10 (0.6)                    | 2 (1)                                                        |
| Missing                                                    | 0 (0)                       | 0 (0)                                                        |
| **Identifies as intersex**                                 |                             |                                                              |
| No                                                         | 1604 (95)                   | 196 (93)                                                     |
| Yes                                                        | 69 (4)                      | 12 (6)                                                       |
| Prefer not to say                                          | 21 (1)                      | 2 (1)                                                        |
| Missing                                                    | 0 (0)                       | 0 (0)                                                        |
| **Sexual orientation**                                    |                             |                                                              |
| Asexual                                                    | 252 (15)                    | 20 (10)                                                      |
| Bisexual                                                   | 571 (34)                    | 68 (32)                                                      |
| Gay                                                        | 348 (21)                    | 47 (22)                                                      |
| Lesbian                                                    | 218 (13)                    | 26 (12)                                                      |
| Pansexual                                                  | 418 (25)                    | 74 (35)                                                      |
| Queer                                                      | 1150 (68)                   | 142 (68)                                                     |
| Questioning                                                | 69 (4)                      | 7 (3)                                                        |
| Same-gender loving                                         | 111 (7)                     | 17 (8)                                                       |
| Straight/heterosexual                                      | 61 (4)                      | 4 (2)                                                        |
| Another sexual orientation                                 | 129 (8)                     | 17 (8)                                                       |
| Multiple sexual orientations                               | 1010 (60)                   | 126 (60)                                                     |
| Missing                                                    | 21 (1)                      | 0 (0)                                                        |
| **Race/ethnicity**                                         |                             |                                                              |
| American Indian or Alaska Native                           | 42 (3)                      | 9 (4)                                                        |
| Asian, Central                                             | 0 (0)                       | 0 (0)                                                        |
| Asian, East                                                | 41 (2)                      | 4 (2)                                                        |
| Asian, South                                               | 19 (1)                      | 5 (2)                                                        |
| Asian, Southeast                                           | 25 (2)                      | 4 (2)                                                        |
| Black or African American                                  | 67 (4)                      | 8 (4)                                                        |
| Hispanic or Latinx                                         | 101 (6)                     | 13 (6)                                                       |
| Middle Eastern or North African                            | 24 (1)                      | 5 (2)                                                        |
| Native Hawaiian or Pacific Islander                        | 5 (0.3)                     | 0 (0)                                                        |
| White                                                      | 1472 (87)                   | 190 (91)                                                     |
| Unknown                                                    | 12 (1)                      | 2 (1)                                                        |
| Another race                                               | 41 (2)                      | 7 (3)                                                        |
| Multiple racial/ethnic identities                         | 202 (12)                    | 34 (16)                                                      |
| None of these                                              | 4 (0)                       | 2 (1)                                                        |
| Missing                                                    | 79 (5)                      | 5 (2)                                                        |

(continued)
of testosterone (Table 2). Of these 12 respondents, seven (58%) had discussed the potential interactions between testosterone use and pregnancy with their health care provider. Three respondents reported using testosterone at the time they became pregnant; of these respondents, one reported two pregnancies while using testosterone. Two of these four pregnancies ended in miscarriage (one after five months of testosterone use, one after six months of testosterone use); one ended in abortion (after four months of testosterone use); and the outcome and testosterone duration for the fourth pregnancy were not reported. None of the respondents who conceived while using testosterone remembered if they were still having regular periods at the time they got pregnant. Eight of the 12 respondents reported stopping testosterone one month prior to getting pregnant. Among these, five stopped testosterone specifically to try to conceive, and three stopped for unrelated reasons. One respondent did not report if testosterone use was ongoing or only prior to conception.

**Pregnancy intention and outcomes**

Respondents reported details on pregnancy intention and outcome for 433 pregnancies (Table 3). Across all 433 pregnancies, the most common outcome was live birth (n = 169, 39%), followed by miscarriage (n = 142, 33%) and abortion (n = 92, 21%). Among live births, 23% (n = 39) were delivered via cesarean section. Live birth, abortion, and miscarriage alternated as the most common pregnancy outcome, depending on racial and ethnic group (Table 4).

Respondents indicated that they were not trying to get pregnant for 54% of pregnancies (n = 233) (Table 3). Among unintended pregnancies, abortion was the most common outcome (n = 88, 38%), followed closely by miscarriage (n = 86, 37%) and live birth (n = 51, 22%). Among intended pregnancies, the most common outcome was live birth (n = 118, 65%) followed by miscarriage (n = 55, 30%). Intended pregnancies were comparable between respondents who had ever used testosterone (38%) compared to those who had not (45%) (p = 0.26). The proportion of ever-pregnant respondents who had experienced one or more unintended pregnancies

---

Table 2. Pregnancy history among an online sample of transgender, nonbinary, and gender-expansive people assigned female or intersex at birth in the United States (n = 1,694).

| Pregnancy History | n   | %    |
|-------------------|-----|------|
| Number of pregnancies |    |      |
| 0                 | 1455| 85.9 |
| 1                 | 115 | 6.8  |
| 2                 | 47  | 2.8  |
| 3                 | 17  | 1.0  |
| 4                 | 14  | 0.8  |
| 5                 | 4   | 0.2  |
| 6                 | 5   | 0.3  |
| 7                 | 4   | 0.2  |
| 8+                | 4   | 0.3  |
| Missing           | 29  | 1.7  |
| Current pregnancy |     |      |
| Yes               | 7   | 0.4  |
| Don’t Know        | 1   | 0.1  |
| Total number of pregnancies | 433| 100  |
| Number of pregnancies after initiating testosterone | 15 | 3.5  |
| Number of pregnancies while on testosterone | 4 | 0.9  |

---

Table 1. Continued.

| Sample Characteristics | All Respondents (n = 1,694) | Respondents who reported ever having had a pregnancy (n = 210) |
|-----------------------|-----------------------------|---------------------------------------------------------------|
| High school degree or less | 141 | 8 | 13 | 6 |
| Some college, trade or tech school | 410 | 24 | 54 | 26 |
| College degree | 644 | 38 | 64 | 31 |
| Grad or professional degree | 410 | 24 | 71 | 34 |
| Missing | 89 | 5 | 8 | 4 |

| Health insurance coverage | n   | %    |
|---------------------------|-----|------|
| No                         | 92  | 5.5  |
| Yes                        | 1512| 89.5 |
| Don’t know                 | 10  | 0.6  |
| Missing                    | 80  | 5    |

| US Census Region | n   | %    |
|------------------|-----|------|
| Midwest          | 304 | 18   |
| Northeast        | 411 | 25   |
| South            | 326 | 19   |
| West             | 468 | 28   |
| Missing          | 185 | 11   |
| Ever pregnant    | 210 | 12   |

---

* Respondents could select all that apply.
was high across all racial and ethnic groups (Table 4).

**Perspectives on future pregnancy**

Across all 1,694 TGE respondents, 11% (n = 186) desired future pregnancy, and an additional 16% (n = 275) were uncertain (Table 5). Of those who desired future pregnancy, 16% (n = 29) had previously been pregnant; 12% (n = 34) of those who were uncertain about future pregnancy desires had previously been pregnant. Among those who desired future pregnancy, 17% (n = 31) would like to get pregnant in the next year. Nearly one in five respondents considered themselves to be “at risk” of getting pregnant at a time when they did not want to be pregnant (n = 182, 11%) or were unsure about their “risk” (n = 111, 7%). The proportion who considered themselves “at risk” for unintended pregnancy similarly ranged from 9-14% across racial and ethnic identities, with the exception of one small group among whom 40% (n = 2) considered themselves at-risk (Table 4).

**Discussion**

In this national online survey, 1,694 TGE individuals assigned female or intersex at birth provided data on pregnancy intentions and outcomes. More than one in ten participants reported a past or current pregnancy as well as a desire for future pregnancy. Respondents provided detailed information on pregnancy outcomes for 433 pregnancies, testosterone use in relation to pregnancy, and past and future intentions for pregnancy. To our knowledge, this is the largest report of pregnancies experienced by TGE people. These data offer clinicians, researchers, and community members a better understanding of the frequency and distribution of pregnancy outcomes among gender-diverse populations, toward the goal of improved evidence-based and culturally competent pregnancy care for these populations.

The frequency of pregnancy outcomes reported in this study can be compared to only a handful of prior quantitative studies that report on pregnancy, abortion, birth, miscarriage, and ectopic pregnancies among TGE individuals in the United States (Beckwith et al., 2017; Light et al., 2014; 2018). A 2013 survey reported on the experiences of 41 transgender men who had each been pregnant and delivered a live neonate (Light et al., 2014). Among all live births, 30% reported a cesarean delivery, as compared to 23% reported in our study, while 32% of pregnancies were unintended, compared to 54% in ours. We report fewer pregnancies after initiation of testosterone (3% versus 61% of pregnancies) but a comparable percentage of people who reported stopping testosterone to get pregnant (68% versus 73%).

A more recent study reported on 32 transgender men and their 60 pregnancies, 48% of which resulted in delivery (versus 39% in ours), 23% in miscarriage (versus 33% in ours), 12% in abortion (versus 21% in ours), and 5% were pregnant at the time of the study (versus 2% in ours) (Light et al., 2018). A 2018 abstract reported 28 TGE participants with unplanned pregnancy, of which 36% chose abortion (Beckwith et al., 2017). We found no difference in likelihood of intended pregnancy between those who had ever taken testosterone and those who had not in contrast to a prior study where those who had never taken testosterone were nearly three times more likely to have been pregnant than those who had ever taken testosterone (Light et al., 2018).

With regard to future pregnancy desires, a small number of prior studies have measured this
Table 4. Pregnancy intentions and outcomes by racial and ethnic identities, among an online sample of transgender, nonbinary, and gender-expansive people assigned female or intersex at birth in the United States (n = 1,694).

| Overall (n = 1,694) | American Indian & Alaska Native (n = 42) | Asian (n = 77) | Black or African American (n = 67) | Hispanic or Latinx (n = 101) | Middle Eastern or North African (n = 24) | Native Hawaiian & other Pacific Islander (n = 5) | White (n = 1,472) | Multiple racial identities (n = 202) |
|---------------------|------------------------------------------|----------------|-----------------------------------|-------------------------------|----------------------------------------|-----------------------------------------------|------------------|-------------------------------|
|                     | N %                                      | N %            | N %                               | N %                           | N %                                    | N %                                           | N %              | N %                           |
| **Ever use of testosterone** |                                         |                |                                   |                               |                                        |                                               |                  |                               |
| Ever use of testosterone | 469 28                                   | 14 33          | 15 19                             | 18 27                         | 26 26                                  | 6 25                                           | 1 20             | 421 29                        |
| **Ever pregnant** |                                         |                |                                   |                               |                                        |                                               |                  |                               |
| Ever pregnant | 210 12                                   | 9 21           | 12 19                             | 8 12                          | 13 13                                  | 5 21                                           | 0 0              | 190 13                        |
| **Pregnancies per respondent** |                                         |                |                                   |                               |                                        |                                               |                  |                               |
| 0                  | 1455 – 33 – 65 – 59 – 88 – 19 – 5 – 1280 – 168 – |                |                                   |                               |                                        |                                               |                  |                               |
| 1                  | 115 – 9 – 8 – 7 – 4 – 0 – 0 – 102 – 19 – |                |                                   |                               |                                        |                                               |                  |                               |
| 2                  | 47 – 2 – 0 – 4 – 0 – 0 – 0 – 43 – 8 – |                |                                   |                               |                                        |                                               |                  |                               |
| 3+                 | 48 – 1 – 0 – 2 – 1 – 0 – 0 – 45 – 7 – |                |                                   |                               |                                        |                                               |                  |                               |
| Missing            | 29 – 0 – 0 – 0 – 0 – 0 – 0 – 2 – 0 – |                |                                   |                               |                                        |                                               |                  |                               |
| **Total pregnancies** | 433 – 36 – 19 – 8 – 21 – 8 – 0 – 393 – 69 – |                |                                   |                               |                                        |                                               |                  |                               |
| **Pregnancy outcomes** |                                         |                |                                   |                               |                                        |                                               |                  |                               |
| Still pregnant | 7 2                                       | 0 0            | 0 0                               | 0 0                           | 0 0                                    | 0 0                                            | 0 0              | 7 2                           |
| Miscarriage        | 142 33                                    | 18 50          | 9 47                              | 5 63                          | 4 19                                   | 3 38                                           | 0 0              | 127 32                        |
| Ectopic pregnancy | 2 0.5                                     | 0 0            | 0 0                               | 0 0                           | 0 0                                    | 1 13                                           | 0 0              | 2 0.5                         |
| Abortion           | 92 21                                     | 2 6            | 6 32                              | 2 25                          | 7 33                                   | 1 13                                           | 0 0              | 90 23                         |
| Stillbirth         | 2 0.5                                     | 0 0            | 0 0                               | 0 0                           | 0 0                                    | 0 0                                            | 0 0              | 2 0.5                         |
| Live birth         | 169 39                                    | 14 39          | 4 21                              | 1 13                          | 10 48                                  | 3 38                                           | 0 0              | 158 40                        |
| Unknown            | 19 4                                       | 2 6            | 0 0                               | 0 0                           | 0 0                                    | 0 0                                            | 0 0              | 7 2                           |
| Cesarean birth     | 39 23                                     | 3 21           | 1 25                              | 0 0                           | 1 10                                   | 0 0                                            | 0 0              | 37 23                         |
| **Ever had an unintended pregnancy** |                                         |                |                                   |                               |                                        |                                               |                  | 139 73 26 76 |
| Considers self at risk for future unplanned pregnancy | 182 11                                   | 4 10           | 9 12                              | 6 9                           | 14 14                                  | 3 13                                           | 2 40             | 157 11 26 13 |

**INTERNATIONAL JOURNAL OF TRANSGENDER HEALTH**
sentiment among TGE populations outside of the United States. One study in Australia found that 13% \((n = 21)\) of 160 transgender and gender-diverse people indicated that they desired to have children in the future (Riggs et al., 2016) – similar to the 11% reported in our sample. In a study of 433 transgender people ages 16 years and older in Canada, 32.3% \((n = 148)\) desired a child in the future (Pyne et al., 2015). Notably, these two studies included individuals assigned male at birth – while ours included only those assigned female or intersex at birth. Despite these differences, these studies confirm that many TGE individuals desire future pregnancy, and preconception and pregnancy planning services should be adapted to be more gender-inclusive and offered to all.

Across studies with quantitative data on pregnancy experiences and outcomes among TGE individuals, we are beginning to see some patterns. However, due to differences in sample recruitment, differences in study population by gender identity and age variation, comparisons across studies are difficult. Routine collection of sexual orientation and gender identity information in all administrative datasets that record pregnancy and birth outcomes will be essential to understand the baseline epidemiology of these communities (CDC, 2020).

**Implications for practice**

These data provide insight into the distribution of pregnancy experiences and outcomes among TGE people assigned female or intersex at birth in the United States. Findings highlight the reality that TGE people in the United States plan for pregnancy, experience pregnancy (intended and unintended) and all pregnancy outcomes, and are engaged in family building. These results provide insight into the characteristics of TGE people who experience pregnancy, and explore the relationship between pregnancy intentions and outcomes for this understudied population, as well as pregnancy outcomes by racial and ethnic identities.

The implications for clinicians are clear: sexual and reproductive health providers should avoid assumptions about pregnancy capacity or intentions based on a patient’s presumed or stated gender or engagement with gender-affirming hormone therapy. The fact that nearly one in five respondents felt “at risk” of unintended pregnancy, or were unsure of their risk, emphasizes the need for improved contraceptive counseling and care delivery for these populations (Agenor et al., 2020; Bonnington et al., 2020; Boudreau & Mukerjee, 2019; Krempasky et al., 2020). Toward the other end of the family planning spectrum, that one in four respondents desired or were uncertain about future pregnancy desires underscores the need for providers to evaluate fertility plans with all patients, regardless of gender, and to offer high-quality, gender-affirming pre-conception care for those that want it. Relevant for both those desiring pregnancy and those trying to avoid pregnancy, the finding that some pregnancies occurred after starting and while using testosterone reiterates that testosterone does not completely prevent ovulation or pregnancy even if it may attenuate it by an unknown amount. (Bonnington et al., 2020; Krempasky et al., 2020; Light et al., 2014, 2018). The potential for both potentially impaired fertility and pregnancy while using testosterone should be discussed with all patients initiating testosterone.

The findings presented here add a quantitative picture to experiences of pregnancy reported so powerfully by TGE people in the qualitative literature – findings that underscore the need for quantitative research. TGE people in the United States have reported delaying pregnancy due to a lack of data on the influence of testosterone on pregnancy outcomes, or conversely, delaying gender-affirmation hormone therapy until fertility

| Future pregnancy intentions | n | % |
|-----------------------------|---|---|
| Would like to get pregnant at some point | 1030 | 61 |
| No | 186 | 11 |
| Yes | 275 | 16 |
| Don’t Know | 203 | 12 |
| Would like to get pregnant: | | |
| Within next year | 31 | 2 |
| Within next 5 years | 60 | 4 |
| Within 6-10 years | 57 | 3 |
| More than 10 years | 4 | 0 |
| Don’t Know | 11 | 1 |
goals are achieved because of this same lack of data (Hoffkling et al., 2017; Wingo et al., 2018). It is our hope that the data presented here begin to address this gap in the evidence.

**Limitations**

No measures of pregnancy intentions or pregnancy outcomes have been developed or validated specifically for TGE people. We (in collaboration with a community advisory team) subsequently developed our own measures, but we cannot comment on their sensitivity in capturing the intended outcomes. Due to the cross-sectional nature of this survey, these data rely on respondent recall of testosterone initiation and cessation dates, pregnancy conception dates, and pregnancy intentions at the time of pregnancy, which may have occurred many years prior and may be subject to recall bias. Specific to pregnancy intentions, people may be more likely to report a pregnancy as “intended” when asked retrospectively, even if they were not trying to become pregnant at that time, because perceptions of past conception can change over time (Rocca et al., 2019). As a result, pregnancies reported in this study as unintended (54%) may be an underestimate. Similarly, even though we asked about abortion in two different ways, it is well established that people underreport abortion in surveys due to social stigma and a desire to protect privacy (Jagannathan, 2001; Jones & Forrest, 1992; Moseson et al., 2015). An additional limitation includes the low proportion of respondents from some racial and ethnic groups: while 28% of ever-pregnant respondents indicated at least one race or ethnicity other than “white,” many groups included only a few respondents. This limited our ability to evaluate patterns in pregnancy outcomes by racial/ethnic identity.

Finally, although we included participants assigned both female and intersex at birth in this analysis, this survey was designed to capture experiences based on participant gender identity, not sex assigned at birth. Results of this study do not offer an in-depth or nuanced analysis of pregnancy intentions or outcomes that may be specific to individuals with an intersex assignment at birth or an intersex identity/lived experience. These experiences are deserving of further inquiry.

**Conclusion**

These findings summarize one of the largest known datasets of pregnancy intentions and outcomes of TGE people assigned female or intersex at birth and provide needed insight into the family planning needs of these understudied populations. Clinicians can draw on these data to inform the information and care provided to TGE patients related to pregnancy, while TGE individuals can utilize these findings to contextualize their own reproductive experiences. The data on the incidence and distribution of major pregnancy outcomes among TGE people presented here will build the evidence based for gender-inclusive pregnancy care, and can be used to evaluate where family planning services are succeeding, and where they are falling short, for TGE people in the United States.

**Disclosure of conflicts**

JOM has consulted for Sage Therapeutics (May 2017) in a one-day advisory board, Ibis Reproductive Health (a non-for-profit research group 3/2017-5/2018), and Hims Inc. (2019 - present) and Folx, Inc. (2020 – present). MRL has consulted for Hims, Inc. (2019 - present) and Folx, Inc. (2020 - present). None of these roles present a conflict of interest with this work as described here. All other authors declare they have no conflicts of interest.

**Ethical approval**

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committees and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed consent**

Informed consent was obtained from all participants in accordance with IRB guidelines.
Funding

This study was funded by a grant from the Society of Family Planning to HM (SFPRF12-III). JOM was partially supported by K23DK111028 from the National Institute of Diabetes, Digestive, and Kidney Disorders. AF was supported by the National Institute on Drug Abuse (K23DA039800). Research reported in this article was partially funded through a Patient-Centered Outcomes Research Institute (www.pcori.org; PPRN-1501-26848) to MRL. The statements in this article are solely the responsibility of the authors and do not necessarily represent the views of Patient-Centered Outcomes Research Institute, its Board of Governors or Methodology Committee, or the National Institutes of Health.

ORCID

Heidi Moseson https://orcid.org/0000-0002-2488-2429
Mitchell R. Lunn https://orcid.org/0000-0002-0068-0814
Micah E. Lubensky https://orcid.org/0000-0001-8882-0967
Juno Obedin-Maliver https://orcid.org/0000-0002-0945-2842

References

ACOG. (2011, December 2011). Health care for transgender individuals. Committee opinion. https://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2011/12/health-care-for-transgender-individuals
Agenor, M., Cottrill, A. A., Kay, E., Janiak, E., Gordon, A. R., & Potter, J. (2020). Contraceptive beliefs, decision making and care experiences among transmasculine young adults: A qualitative analysis. Perspectives on Sexual and Reproductive Health, 52(1), 7–14. https://doi.org/10.1363/psrh.12128
Barker, J. (Writer). (2018). A deal with the universe. In.
Beatie, T. (2008, March 14). Labor of love: Is society ready for a pregnant male? Advocate.
Beckwith, N., Reisner, S., Zaslow, S., Mayer, K., & Keuroghlian, A. (2017). Factors associated with gender-affirming surgery and age of hormone therapy initiation among transgender adults. Transgender Health, 2(1), 156–164. https://doi.org/10.1089/trgh.2017.0028
Bonnington, A., Dianat, S., Kerns, J., Hastings, J., Hawkins, M., De Haan, G., & Obedin-Maliver, J. (2020). Contraceptive counseling for transgender and gender diverse people who were female sex assigned at birth. Contraception, 102(2), 70–82. https://doi.org/10.1016/j.contraception.2020.04.001
Boudreau, D., & Mukerjee, R. (2019). Contraception care for transmasculine individuals on testosterone therapy. Journal of Midwifery & Women’s Health, 64(4), 395–402. https://doi.org/10.1111/jmwh.12962
Callegari, L. S., Aiken, A. R., Dehlendorf, C., Cason, P., & Borrero, S. (2017). Addressing potential pitfalls of reproductive life planning with patient-centered counseling. American Journal of Obstetrics and Gynecology, 216(2), 129–134. https://doi.org/10.1016/j.ajog.2016.10.004
CDC. (2020, April 1). Collecting sexual orientation and gender identity information. https://www.cdc.gov/hiv/clinicians/transforming-health/health-care-providers/collection-sexual-orientation.html
Cipres, D., Seidman, D., Cloniger, C., Nova, C., O’Shea, A., & Obedin-Maliver, J. (2017). Contraceptive use and pregnancy intentions among transgender men presenting to a clinic for sex workers and their families in San Francisco. Contraception, 95(2), 186–189. https://doi.org/10.1016/j.contraception.2016.09.005
Davis, K. (Writer). (2001). Southern Comfort. In. Dutton, L., Koenig, K., & Fennie, K. (2008). Gynecologic care of the female-to-male transgender man. Journal of Midwifery & Women’s Health, 53(4), 331–337. https://doi.org/10.1016/j.jmwh.2008.02.003
Ellis, S. A., Wojnar, D. M., & Pettinato, M. (2015). Conception, pregnancy, and birth experiences of male and gender variant gestational parents: It’s how we could have a family. Journal of Midwifery & Women’s Health, 60(1), 62–69. https://doi.org/10.1111/jmwh.12213
Fein, L. A., Zaw, C., Wong, A., Jhaveri, V., Gerkowicz, S. A., & Potter, J. (2019). Reproductive health care knowledge, needs, and access among transgender men. Obstetrics & Gynecology, 133(1), 192S–193S. https://doi.org/10.1097/AOG.0000000000003506
Finlay, J. (Writer). (2019). Seahorse. In.
Hahn, M., Sheran, N., Weber, S., Cohan, D., & Obedin-Maliver, J. (2019). Providing patient-centered perinatal care for transgender men and gender-diverse individuals: A collaborative multidisciplinary team approach. Obstetrics and Gynecology, 134(5), 959–963. https://doi.org/10.1097/AOG.0000000000003506
HempeI, J. (2016, September 12). My brother’s pregnancy and the making of a new American family. Time.
Hoffkling, A., Obedin-Maliver, J., & Sevelius, J. (2017). From erasure to opportunity: A qualitative study of the experiences of transgender men around pregnancy and recommendations for providers. BMC Pregnancy and Childbirth, 17(Suppl 2), 332. https://doi.org/10.1186/s12884-017-1491-5
Huberdeau, R. (Writer). (2012). Transforming family. In. Human Rights Watch & InterAct Advocates for Intersex Youth. (2017). “I want to be like nature made me”. Medically unnecessary surgeries on intersex children in the US. https://www.hrw.org/sites/default/files/report_pdf/lgbtintersex0717_web_0.pdf
InterAct Advocates for Intersex Youth & Lambda Legal. (2018). Providing ethical and compassionate health care to intersex patients: Intersex-affirming hospital policies. https://live-interact-advocates.pantheonsite.io/wp-content/uploads/2018/09/InterACT-Lambda-Legal-intersex-hospital-policies.pdf
Jagannathan, R. (2001). Relying on surveys to understand abortion behavior: Some cautionary evidence. *American Journal of Public Health, 91*(11), 1825–1831. https://doi.org/10.2105/ajph.91.11.1825

James, S. E., Herman, J. L., Rankin, S., Keisling, M., Mottet, L., & Anafi, M. (2016). *The Report of the 2015 U.S. Transgender Survey*. https://transequality.org/sites/default/files/docs/usts/USTS-Full-Report-Dec17.pdf

Jones, E. F., & Forrest, J. D. (1992). Underreporting of abortion in surveys of U.S. Women: 1976 to 1988. *Demography, 29*(1), 113–126. https://doi.org/10.2307/2061366

Krempasky, C., Harris, M., Abern, L., & Grimstad, F. (2020). Contraception across the transmasculine spectrum. *American Journal of Obstetrics and Gynecology, 222*(2), 134–143. https://doi.org/10.1016/j.ajog.2019.07.043

Light, A., Wang, L. F., Zeymo, A., & Gomez-Lobo, V. (2018). Family planning and contraception use in transgender men. *Contraception, 98*(4), 266–269. https://doi.org/10.1016/j.contraception.2018.06.006

Light, A., Obedin-Maliver, J., Sevelius, J., & Kerns, J. (2014). Transgender men who experienced pregnancy after female-to-male gender transitioning. *Obstetrics and Gynecology, 124*(6), 1120–1127. https://doi.org/10.1097/AOG.0000000000000540

Makadon, H. J., Mayer, K. H., Potter, J., & Goldhammer, H. (2015). *The Fenway guide to lesbian, gay, bisexual, and transgender health* (2nd ed.). Fenway Institute, Fenway Health.

Moseson, H., Lunn, M. R., Katz, A., Fix, L., Durden, M., Stoeffler, A., Hastings, J., Cudlitz, L., Goldberg, E., Lesser-Lee, B., Letcher, L., & Reyes, A. (2020, May). The imperative for transgender and gender nonbinary inclusion: Beyond women's health. *Obstetrics and Gynecology, 135*(5), 1059–1068. https://doi.org/10.1097/AOG.0000000000003816

Obedin-Maliver, J., & Makadon, H. J. (2016). Transgender men and pregnancy. *Obstetric Medicine, 9*(1), 4–8. https://doi.org/10.1177/1753495X15612658

Pearce, R., & White, F. R. (2019). Beyond the pregnant man: Representing trans pregnancy in a deal with the universe. *Feminist Media Studies, 19*(5), 764–767. https://doi.org/10.1080/14680777.2019.1630925

Pyne, J., Bauer, G., & Bradley, K. (2015). Transphobia and other stressors impacting trans parents. *Journal of GLBT Family Studies, 11*(2), 107–126. https://doi.org/10.1080/1550428x.2014.941127

Reisner, S. L., Perkovich, B., & Mimiaga, M. J. (2010). A mixed methods study of the sexual health needs of New England transmen who have sex with nontransgender men. *AIDS Patient Care STDs, 24*(8), 501–513. https://doi.org/10.1089/apc.2010.0059

Riggs, D., Power, J., & von Doussa, H. (2016). Parenting and Australian trans and gender diverse people: An exploratory survey. *International Journal of Transgenderism, 17*(2), 59–65. https://doi.org/10.1080/15532739.2016.1149539

Rocca, C. H., Wilson, M. R., Jeon, M., & Foster, D. G. (2019). Stability of retrospective pregnancy intention reporting among women with unwanted pregnancies in the United States. *Maternal and Child Health Journal, 23*(11), 1547–1555. https://doi.org/10.1007/s10995-019-02782-9

Wingo, E., Ingraham, N., & Roberts, S. C. M. (2018). Reproductive health care priorities and barriers to effective care for LGBTQ people assigned female at birth: A qualitative study. *Women's Health Issues: Official Publication of the Jacobs Institute of Women's Health, 28*(4), 350–357. https://doi.org/10.1016/j.whi.2018.03.002