



## Medical uncertainty and reproduction of the “normal”: Decision-making around testosterone therapy in transgender<sup>1</sup> pregnancy<sup>☆,☆☆</sup>



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Medical expertise and authority often serve as foundations upon which patients' uptake of medical advice is built, and possibilities for health-focused behavioral changes in the patient's life are motivated and compelled (Pescosolido, Tuch, & Martin, 2001). This expertise is operationalized through processes of medical social control, surveillance, and bureaucratic technologies, particularly in the context of ambiguity and uncertainty (Almeling, 2020, 2022; Conrad, 1992; Freeman, 2015; Poteat, German, & Kerrigan, 2013; shuster, 2019, 2021; Timmermans & Almeling, 2009). In the case of pregnancy, health care providers dispense advice and protocols around nutrition, exercise, pharmaceutical and substance use, mental health, and the need for regular medical monitoring to protect the health and wellbeing of, essentially, two patients—the pregnant person and the fetus (Rothman, 2014).

But what happens when medical science doesn't yet have all the answers about how patient behaviors may relate to health outcomes for both the pregnant person and the fetus—particularly when they may create potentially-divergent health outcomes for the pregnant person and fetus? How do patients and providers understand and weigh relative health risks and benefits as they formulate, dispense, or work to interpret and follow medical advice at this complicated intersection? How might assessment of health risks, and concomitant medical advice for behavioral change, reflect historical and ongoing social practices for creating

“ideal” and normative bodies and people?

In this work, we draw upon in-depth interview and focus group data from a three-year international study of 70 trans people (residing across Australia, Canada, the European Union, United Kingdom, and the United States) about their intentions and experiences around pregnancy, as well as 22 health care providers (practicing across Australia, Canada, the European Union, the United Kingdom, and the United States) with self-identified experience working with trans patients and pregnancy along a diverse cross-section of specialty areas (e.g., psychotherapists, general practitioners, endocrinologists, midwives, lactation consultants, OBGYNs, fertility specialists). The central motivating questions guiding the present work are: 1) For trans people who are taking testosterone, what is the medical advice and guidance around stopping or pausing testosterone therapy to become pregnant, throughout pregnancy, and during the postpartum period (particularly in the context of chestfeeding/breastfeeding<sup>2</sup>); 2) What is the evidence base in the medical empirical literature for this guidance; and 3) How do trans people respond to this guidance?

The answers to these questions are likely to be quite impactful for trans people as testosterone therapy among these populations generally serves to reduce gender dysphoria, protect mental health, and provide a greater likelihood of being recognized by social peers in accordance with

\* A brief synopsis of some of the findings reported herein has been published in [The Conversation](#).

☆☆ The research described herein was funded by a grant (ES/N019067/1) from the Economic and Social Research Council. The funder played no role in the study design, data collection, analysis and interpretation of data, writing of study reports, or decisions about where to submit reports for publication.

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<sup>1</sup> In this work, we use “transgender” and “trans” as imperfect shorthand for a much more diverse cross-section of research participants who self-identified as men, trans men, transmasculine, and nonbinary.

<sup>2</sup> “Chestfeeding” is a term that some (but not all) trans people use to describe the experience often referred to as “breastfeeding.” As is true for cis people, not all trans people choose to or are able to lactate and feed their infants their own milk.

one's gender (Lagos, 2019). These answers may also be potentially consequential for the offspring of those receiving and following various advice; our understandings of biological and social reproduction and what constitutes “men’s” versus “women’s” hormones; ongoing legacies of eugenics; and how individuals and their health care providers make determinations around their own and others’ “social fitness,” health, and wellbeing.

## 1. Background

### 1.1. Hormone therapy for trans people and the sociomedical binarization of sex and gender

Like some cisgender men and women, some but not all trans people pursue hormone therapy to raise their testosterone levels. Testosterone therapy may be administered orally, topically, transdermally, and through injection subcutaneously or intramuscularly (Moravek, 2018). The effects of testosterone administration include but are not limited to facial and body hair growth, lowering of vocal pitch, facial squaring, clitoral growth, absent or infrequent menstrual periods, acne, balding, muscle development, increased libido, and redistribution of body fat (Cocchetti, Ristori, Romani, Maggi, & Fisher, 2020; Irwig, 2017). For many trans people, testosterone treatment is also associated with considerable improvement of mental health, including reductions in depression, anxiety, and social distress (Irwig, 2017).

While testosterone is widely considered a “male hormone,” all people have testosterone and the variation in testosterone levels among cisgender men is greater than the mean difference between cisgender men and cisgender women as groups (Oudshoorn, 1994). For example, among cisgender men, serum testosterone levels in the range from 320 to 1000 ng/dl are generally considered normal, while values from 15 to 70 ng/dl are considered ‘normal’ among cisgender women (Moravek et al., 2020). Among those individuals with the most common cause of infertility related to ovulation, Polycystic Ovary Syndrome (PCOS), testosterone levels can range from 1 to just over 200 ng/dl (Legro et al., 2010).

There is no universal or standard protocol for trans people undergoing hormone treatment with testosterone (Moravek, 2018). However, the Endocrine Society has issued treatment guidelines suggesting supplementation with testosterone until serum testosterone ranges fall within the normal ranges for cisgender men (Moravek et al., 2020). These clinical guidelines and standards, which have become fairly normalized in practice, further instantiate and reproduce sex and gender binaries that may not fit with the actual desires of all trans people (Cocchetti et al., 2020). Some trans people have therefore resisted the prescriptive sex-binarized dosing of testosterone and other hormone therapies by crowdsourcing information online, micro-dosing, banking/sharing testosterone, and/or tailoring customized dosing on their own if they are unable to find or access health care practitioners willing to work with them to achieve their aims (Rotondi et al., 2013; van Dijken, Steensma, Wensing-Kruger, den Heijer, & Dreijerink, 2022; Vincent, 2019).

In some countries and jurisdictions both historically and today, trans people are required to undergo hysterectomy and bilateral salpingo-oophorectomy (removal of uterus, fallopian tubes, and ovaries) in order to be considered eligible candidates for medically facilitated testosterone hormone therapy or to be classified, legally, as male (Honkasalo, 2019; Radi, 2020; Toze, 2018). These medicine and state-sponsored enforcements of sex and gender binaries echo eugenic practices as they work to preclude possibilities such as the existence of pregnant men and trans reproduction. Indeed, as Almeling (2022:474) notes: “From the earliest days of medical specialisation, physicians positioned the male body as a neutral medical ‘standard’ and the female body as ‘reproductive.’” Even within the past decade, some medical literature regarded trans pregnancy after the initiation of testosterone therapy as physiologically impossible (T’Sjoen, Caenegem, & Wierckx, 2013). Despite this, pregnant trans people have become increasingly socially visible as they form contemporary queer families (Hines, Pearce,

Pfeffer, Riggs, & White, 2021; Pfeffer & Jones, 2020), even as the media treats the figure of the pregnant man as perennially new over decades of coverage—a sort of gendered Groundhog Day (Lampe, Carter, & Sumerau, 2019). It is in this context of binary social and medical understandings of sex and gender that trans people navigate both hormone therapy and reproduction.

Current medical guidance around trans people, and pregnancy reflects these same binary logics. As Almeling (2022:475) notes: “Cultural beliefs about male and female as separate and opposite sex categories have undergirded the production of so many forms of biomedical knowledge, including in the realm of reproductive health.” For example, trans people who are seeking to harvest and store their gametes to become pregnant, or who discover that they are pregnant, are medically counseled to discontinue any testosterone hormone treatment they may be taking immediately, throughout their pregnancy and, in general, until they are no longer chestfeeding or breastfeeding (if they choose and are able to do so) (Light, Obedin-Maliver, Sevelius, & Kerns, 2014; Obedin-Maliver & Makadon, 2016). This medical guidance for trans people is based largely on understandings that testosterone, as a “male” hormone, is incompatible with conception, pregnancy, and lactation as “female” biological processes, as well as concerns around potential pre-conception ova, prenatal embryonic and fetal, and postpartum infant exposures to “excess androgens” (Moravek et al., 2020; Oudshoorn, 1994).

In the latest edition of the World Professional Association for Transgender Health *Standards of Care for the Health of Transgender and Gender Diverse People*, discontinuation of testosterone prior to and throughout pregnancy (and during chest feeding) is “recommended” and its continuation during these same periods is not recommended “given its potential iatrogenic<sup>3</sup> effects on the fetus” (Coleman et al., 2022, p. S161). However, the authors note relatively scant and inconclusive empirical evidence linking continuing hormone treatment with any particular health outcomes in offspring of trans men.

Medical studies of “excess androgen” exposure on ova, embryos, fetuses, and infants do exist, however, vis-à-vis the aforementioned individuals with PCOS who have become pregnant, given birth, and nursed their offspring (Hart, 2019; Xita & Tsatsoulis, 2014). While these empirical studies are largely focused on cisgender women, they provide important lessons for how the maintenance of socially normative systems inform medical treatment considerations and practice guidelines as well as serve as a comparative case for considering the experiences of trans people, testosterone therapy management, and pregnancy.

### 1.2. (Re)producing “normal”? Medical empirical literature on prenatal and postpartum exposure to “excess androgen”

The medical empirical research literature on pre-conception, prenatal, and postpartum exposure to androgens (like testosterone) on conception, pregnancy, and development of offspring are relatively limited, largely focusing on gestational parents with PCOS, Congenital Adrenal Hyperplasia (CAH), or, more recently, trans people taking testosterone as hormone therapy (e.g., Cho, Harjee, Roberts, & Dunne, 2020; Greenwald, Dubois, Lekovich, Pang, & Safer, 2022; Stark & Mok-Lin, 2022). PCOS is the leading cause of infertility related to ovulation, but conception is not impossible among all those with this condition. Those with PCOS often report facial and body hair, balding, absent or infrequent menstrual periods, acne, weight gain, depression, and anxiety (Cesta et al., 2020; Legro et al., 2010). Further, a number of empirical studies report associations between PCOS and being lesbian and/or trans (Agrawal et al., 2004; Baba et al., 2007; Gezer et al., 2021; Swift-Gallant, Johnson, Di Rita, & Breedlove, 2020). Empirical literature expresses concern that the androgenic fetal environment among those with PCOS “may program PCOS in the offspring” (Hart, 2019, p. 4). It also counsels those with PCOS to lose weight while simultaneously

<sup>3</sup> “Iatrogenic” refers to a health condition caused by medical treatment itself.

recommending against bariatric surgery (the only weight loss method with empirically supported long-term efficacy; Arterburn et al., 2021) and notes there is no evidence that doing so will reduce potential short or long-term health effects among the offspring of those born to a gestational parent with PCOS (Hart, 2019).

Concerns about fetal exposure to “excess androgens” among offspring born to people with PCOS include, among others, urogenital and intersex conditions (such as an enlarged clitoris or other forms of “ambiguous genitalia”) and later development of “metabolic dysfunction” (including “obesity” and PCOS), non-normative sexual identities, and/or “neuropsychiatric disorders” such as Autism Spectrum Disorder (ASD) and Attention Deficit Hyperactivity Disorder (ADHD), largely among those categorized female at birth (Byne, 2006; Cesta et al., 2020; Hakim, Padmanabhan, & Vyas, 2017; McDonnell & Hart, 2017; Palomba et al., 2015; Risal et al., 2019). These same studies often do show increased associations between these conditions, experiences, and identities among the offspring of gestational parents with higher-than-average levels of testosterone during the gestational period.

However, making causal claims about associations between “excess androgens” and the aforementioned conditions would be scientifically misguided (Cesta et al., 2020; Susser, 1985). Long latency periods (Susser, 1985) between in-utero exposures to “excess androgens” and offspring’s later development or diagnosis of nearly all of the aforementioned embodiments and identities (with the exception of some intersex characteristics) renders causal assertions suspect. The potential for parental “excess androgens” to be confounded (Susser, 1985) with other possible parental conditions or differences (e.g., insulin resistance, congenital adrenal hyperplasia, genetic variations) may also result in causal misattribution of parental androgen levels for particular offspring outcomes that ignores the originating drivers of parental elevated androgen levels themselves (Cesta et al., 2020). Further, as Richardson (2021) notes, scientific evidence for establishing gestational exposure as a causal mechanism for later development of various human embodiments and health conditions is often cryptic at best. While we may be able to use current scientific tools to measure and establish various “excesses,” “deficits,” or diversions from metrics established as “normal,” this information does not always translate to perceived differences in actual human embodiments, experiences, or health across the life course.

The fact that a common parallel to some trans people’s potential “androgen excess” in the context of pregnancy has long existed among cisgender women provides additional insights and pathways for further consideration. Indeed, PCOS affects as many as one in ten people of reproductive age who have ovaries, often resulting in higher endogenous<sup>4</sup> levels of testosterone and, consequently, some of the same physical characteristics many trans people seek to develop (Hayek, Bitar, Hamdar, Mirza, & Daoud, 2016). While higher levels of testosterone may make it more difficult to become and remain pregnant, those diagnosed with PCOS are not routinely placed on testosterone blockers during pregnancy or discouraged from feeding their infants milk that they produce (Nardo, Rai, Backos, El-Gaddal, & Regan, 2002). Many of those with PCOS, however, are routinely counseled to lose weight and limit the amount of weight gained across pregnancy (McNaughton, 2010). Despite conflicting empirical evidence, they are also frequently informed that failing to do so may make it more likely that their offspring will have a higher risk of developing the aforementioned characteristics in the future, compelling those with PCOS to engage in behavior modification practices to ensure they do not bear offspring with some of the very same socially-undesirable characteristics (deemed “unhealthy”) they often

have themselves (McNaughton, 2010).

Social justice activists, scholars, and the field of critical studies have made important strides to highlight how the desire to maximize the “fitness” of offspring, and guard against development of conditions or human characteristics considered “unhealthy” or less than ideal, may reflect troubling eugenicist and biomedical moralist underpinnings in ways that further harm already-socially-marginalized people (Honkasalo, 2019; Metzl & Kirkland, 2010; Richardson, 2021; Saguy, 2013; Siebers, 2008; Valdez, 2021). Freeman (2015) argues that contemporary pregnancy, in particular, has become a site of epistemic injustice through processes of medical professionals and technologies assuming power and epistemic authority over pregnancy and pregnant people, often denying or superseding the epistemic privilege, knowledge, and control that a pregnant person has over their own body and embodied pregnancy experience. Similarly, both MacKendrick (2018) and Waggoner (2017) clearly demonstrate how responsibilities for ensuring the health and well-being of embryos, fetuses, children, and families are forms of gendered precautionary labor in which “safety first” approaches result in additional social control over women and their everyday lives, often despite equivocal empirical evidence supporting the benefits of such precautions. In this work, we argue that these forms of gendered precautionary labor and social control are not solely constrained to cisgender women, the context in which they have been explored almost exclusively in the empirical literature to date.

In what follows, we explore the experiences and perspectives of trans people and health care providers as they consider possibilities around testosterone therapy during pregnancy and the postpartum period and make decisions about risk, health, and well-being—for trans people and their offspring. Ultimately, we argue that in the context of lacking and uncertain medical evidence (HRT with testosterone during pregnancy and chest feeding) in a highly gendered treatment context (pregnancy and lactation care), both patients and providers tend to pursue precautionary, offspring-focused treatment approaches. These approaches reinscribe binarized notions of sex, resulting in social control in their attempts to safeguard against non-normative potential future outcomes for offspring. These offspring-focused risk-avoidance strategies and approaches are, we argue, part of the gendered precautionary labor of pregnancy and pregnancy care itself, and not without potentially-harmful consequences for trans people and society more broadly.

## 2. Method

The study involved a cross-sectional in-depth individual and focus group interview design, specifically the collection of qualitative interviews with 70 trans people, and 22 health care providers who self-identified as focusing their practice with trans populations. Inclusion criteria for trans people were: 1) identifying as a man, trans/masculine, and/or non-binary, 2) living in Australia, Canada, the European Union (including the United Kingdom prior to Brexit), or the United States, 3) being at least 18 years of age, and 4) having conceived or willingness to discuss potential conception after coming out or beginning a social and/or medical transition. Inclusion criteria for health care providers were: 1) identifying as a health care provider with a focus working with trans patients and in trans health, 2) living in Australia, Canada, the European Union (including the United Kingdom), or the United States, and 3) being at least 18 years of age.

Ethics approval for the study was granted by the respective human subjects review boards of the authors’ institutions. A purposive sampling technique was employed to obtain participants using social media and social network recruitment, including targeted recruitment distributed to groups comprised of trans people of color. Research informational and recruitment flyers were posted to social media accounts (e.g., private and public Facebook groups, Twitter), shared at community conferences and events, and circulated via researcher and participant networks. Upon contacting the research team, potential participants were provided with a full information sheet about the project, detailing the focus of the project,

<sup>4</sup> Additional research is needed to study the biological effects of endogenous (produced internally) vs. exogenous (supplied externally) forms of hormones in various types of bodies. Some research suggests, for example, that exogenous testosterone therapy among trans men, specifically, neither causes nor worsens the various metabolic abnormalities often experienced among those with polycystic ovary syndrome (Chan, Liang, Jolly, Weinand, & Safer, 2018).

what was requested of them in terms of time, and contacts should they need support following participation. Consent or assent was obtained for all participants (depending upon research site and requirements of each ethics review board) and consent was explicitly continuous, able to be withdrawn by participants at any point in the research process.

Trans participants in the U.S. and Canada were paid \$25-\$50 to participate; participants of color were compensated at a higher rate due to targeted recruitment aims for the study and to reflect structural constraints to participation (e.g., U.S. history of racist research exploitation and increased requests for participation) faced by people of color. Trans participants in the European Union and Australia were not compensated for their participation. This reflected research norms at the institutions where ethical approval was granted, given concerns about compensation for participation in social research as a form of potential coercion. No health care providers in any location were compensated for their participation.

Semi-structured individual and focus group interviews were completed either in person or via tele- and/or video conference facilitated by Skype, Whereby, or Zoom, by the first author (for interviews and focus groups with participants based in the United States and Canada), by the second, third, and sixth author (for focus groups for participants based in the United Kingdom), by the third author (for interviews conducted with participants based in Bulgaria, Germany, and the United Kingdom), by a research associate of the fourth author (for interviews conducted with participants in Australia), or by the fifth author (for interviews conducted with participants based in Italy). Interviews were conducted between June 2018 and October 2019. Interviews ranged from less than 60 min to over 3 h, with an average length of 100 min.

Interviews were transcribed by a professional transcription service and participants either chose their own pseudonym or were given a pseudonym if they did not choose their own. Participants were also asked about pronouns, with most using either he/him or they/them. All interviews were conducted in English, with the exception of health care provider interviews from Italian participants, which were conducted in Italian. Interview transcripts (including those translated from Italian to English) were fidelity checked to ensure that written narratives matched audio recordings and that potentially-identifying information was removed in order to preserve participant confidentiality.

The present work involves analysis of targeted coding around testosterone advisements for trans people in the context of conception, pregnancy, and the postpartum period. Data were coded in the latest edition of NVivo on the cloud collaboration platform and consist of 120 single-spaced pages of individual and focus group interview transcript excerpts specifically at the target-coded node. Coding and data analysis for this work were conducted by the first author and informed by grounded theory (Charmaz, 2006).

Analyses of the data allowed us to develop a number of primary themes, several of which have been developed for publication (Riggs et al., 2020; Riggs, Pfeffer, Hines, Pearce, & White, 2021a; Riggs, Pfeffer, Pearce, Hines, & White, 2021b; Riggs, Pfeffer, White, Hines, & Pearce, 2023). All coding and themes were shared in the NVivo collaborative cloud. The first author and a research assistant identified and collated representative confirming and disconfirming interview excerpts for each theme. While axial coding provided for the analysis of how various demographic factors differentially influence experiences, which will be published elsewhere, the aim of the present analysis is to report on responses, in aggregate, at a particular coded node. This reporting better ensures protection of the confidentiality of participant identities in this targeted analysis. The excerpts included herein are exemplary but not exhaustive of each theme. Having identified representative excerpts for each theme, the first author then compiled the thematic groupings and developed a draft report of results, which was shared with the research team. The research team engaged in collaborative editing of the draft report, resulting in the present manuscript.

### 3. Findings

Here, we detail results of our analyses, which center on two primary themes for how both health care providers and their trans patients navigate existing medical knowledge gaps and uncertainties when dispensing advice and making decisions around whether to continue or pause testosterone therapies in the context of trans reproduction (conception, pregnancy, and postpartum/lactation). First, we find that health care providers reinscribe their status and authority, in the context of uncertainty, by prescribing caution as they advise their trans patients to pause testosterone therapy, center normative development of trans offspring, and cast trans patients' pursuit of testosterone therapy during pregnancy as illicit or selfish. Second, we find that trans patients juggle competing priorities, in the context of uncertainty, as they work to maintain their sense of self and wellbeing, ensure continuing access to health care, and grapple with what it means to protect their offspring from becoming anything other than "normal." Finally, we present narratives from health care providers and patients who consider approaches that offer a potential pathway forward. Drawing upon risk-and-harm-reduction approaches, these narratives offer pragmatic strategies for engaging with the realities of medical uncertainty, ensuring respect for human diversity, and attending to the needs and wellbeing of both trans people and their offspring.

#### 3.1. Health care providers prescribing caution and assigning patient responsibility for reproducing the normal

In the context of limited medical education and medical uncertainties around testosterone therapy and trans reproduction, it was not uncommon for the health care providers we interviewed to describe outdated medical guidance they have offered, to make factually-inaccurate claims, or to cast judgment on their trans patients and their ability to act as responsible (future) parents. One health care provider we interviewed, currently in training to become a lactation consultant, spoke about not receiving *any* targeted education around trans people, testosterone, and lactation during this training. During another interview, we asked a health care provider what she tells her trans patients about fertility preservation prior to them initiating hormone therapy; she said: "I talk about the largely irreversible nature of hormone therapy on gonadal function." Such claims, despite the gravitas they likely hold in health care interactions, have been repeatedly disproven in both the current empirical medical research literature and the lived experience of trans people taking testosterone who have become pregnant.

Despite this misinformation offered by a provider, above, other providers acknowledged that pregnancy was quite possible while on testosterone and described advising their patients to maintain birth control practices if having sex with people who have sperm. This advisement may situate pregnancy while taking supplemental testosterone as risky, per se, even if existing empirical evidence establishing such risks is scant, equivocal, or imbued with normative judgments about potential fetal outcomes. It also conveys a potentially cisnormative assumption that trans people who are taking supplemental testosterone and engaging in sexual practices that may result in pregnancy do not (or should not) actively desire to become pregnant.

When we asked one provider to reflect on how medical advice to trans patients that they should pause testosterone while trying to conceive, during pregnancy, or shortly after giving birth, might affect them, she acknowledged that pausing testosterone therapy during pregnancy could be "incredibly difficult" for her trans patients and that a number have stopped trying to become pregnant altogether because "it's just too hard to be without hormones." Rather than consider or discuss other possible approaches to treating such patients, this provider noted that she was not the doctor who originally prescribed hormones to these patients and remarked:

I only wonder about the quality of the counseling beforehand. Because often, when people want to start hormones, their desire to start hormones is so great that they're a little, you know, blinkered [blinded] perhaps. You know, the need to start hormones is so great that it overrides any other consideration.

Here, the health care provider offers the cisnormative and judgmental assessment that her trans patients' desire to begin hormone therapies obscures their ability to suitably envision and center more normative pursuits (such as pregnancy without testosterone therapy) and the potential risk to normative fetal development it may entail.

Health care providers in our study identified a number of concerns about their patients remaining on testosterone while they were attempting to conceive, during pregnancy, and while chestfeeding or breastfeeding. When asked about the sorts of risks they were most concerned about, health care providers often noted that not enough empirical research has been conducted, that it largely involves theoretical or hypothetical risk assessment, or that the research findings, themselves, are equivocal. As one health care provider noted:

We don't have as much data as I would like. The data that we have suggests that there may be some virilization effects, but we don't have good data. I mean ... [long pause] Basically I would tell him exactly what I tell everybody who asks me about cannabis, which is that we just don't know. There are theoretical risks, there is some data that suggests that the risks may be more than theoretical, but at this point, we don't know.

In the context of medical uncertainty around testosterone therapy during pregnancy, providers offered rationales for following a precautionary approach that centers normative fetal development and advises pausing testosterone therapy.

As one provider stated:

We don't have data on what would happen, if you were on testosterone, to the fetus, right? There's just no data on that. Have I had patients that were on testosterone and didn't know they were pregnant and then went on and had a baby? Yes, you know, and obviously everything looked okay ... I would never say go ahead and be on testosterone and try to get pregnant and then use testosterone throughout the pregnancy. I cannot say that that would be okay because we still consider testosterone a teratogen<sup>5</sup> ... even though we don't have data. They [trans people] think that they should just be able to be pregnant and take testosterone. And I try to explain that we just don't know what would happen to a baby and it's the same with drug use. I mean it's—is it selfish or is it not? You know, I think if you choose to have a pregnancy and your female hormone levels would be already so high that testosterone probably wouldn't even mentally help ... if you're producing breast milk and you couldn't be without testosterone for mental health ... if you couldn't deal without testosterone, then you probably shouldn't be pregnant.

As this narrative clearly demonstrates, while providers often report a paucity of information in the empirical literature on maintaining testosterone therapy during pregnancy, they may still work to advise their trans patients to take a normative fetal-focused precautionary approach and to recommend testosterone therapy pauses without reservation. Some, as with the provider above, may even compare testosterone therapy during pregnancy to illicit drug use, or suggest that testosterone use during pregnancy is selfish and ultimately inconsequential for the mental health and wellbeing of their trans patients. Health care providers whose narratives expressed judgment that trans people who wish to pursue tailored testosterone dosing (or who worry about pausing

testosterone during pregnancy) are selfish or “blinkered” fail to consider the myriad cisnormative structural barriers to culturally-competent care that trans people often face.

### 3.2. Trans patients' competing priorities to recognize themselves, maintain health care, and protect their offspring

Most of our participants reported using testosterone as a critical medically managed component of their transition. Trans people in our study described concerns about pausing testosterone in order to become pregnant, throughout pregnancy, and during the postpartum period. Common fears included potential changes in voice, hair thickness/growth, or fat distribution that may make public recognition as a man more challenging, concerns about increased levels of body dysphoria and depression and higher likelihood of postpartum depression, being feminized and misgendered by providers throughout their pregnancy, and worries that providers may not re-initiate testosterone prescriptions following the birth of a child. When trans people in our study who were taking testosterone sought health care after learning they were pregnant, they reported that their providers advised that testosterone therapy be paused immediately due to potential fetal risks.

Such advisements, however, may not take into full consideration the degree to which some trans people's sense of self and wellbeing is linked to continuing testosterone therapy. For example, one participant described an attempt to pause testosterone as unbearable. He remarked:

I had come to such good terms with myself and with my body, how it affected my sexuality, how I could relate with others—physically, but also generally like how I *moved* in the world. I really felt whole. And having this prospect of having to give this up was so much worse than what I think I had endured before—when I did not even know how good it could feel to be on T.

Another participant, describing his emotions, sense of self, and interactions on testosterone said:

Suddenly my feelings were really on time, like at the point where I was feeling those feelings and, so I became in touch with myself after a long period of not being in touch with myself ... I became more confident or more caring about myself and feeling good. I mean, I always knew that it's important to feel good about oneself or to care about oneself in order to be able to care also for other people. I mean, even if you want to be helpful for others it's better if you are okay with yourself, than if you're just angry or ... or you know? So there were huge reliefs from taking hormones.

In these instances, participants described substantial perceived effects of hormone therapy not only on their personal sense of wellbeing, but on their interpersonal relationships with others as well.

Despite this, most respondents spoke about pausing testosterone administration during pregnancy as a matter of course. As one participant told us about advice he had received from within the trans community: “People did say it [taking testosterone while pregnant] could cause either miscarriage or grievous birth defects. It could impact the natural development and balance of hormones in the baby.” Another participant stated:

I mean there was so many myths. I remember even before Thomas Beatie, there was a general idea that if somebody had been on testosterone and they had a child that that child would be autistic, that was the kind of, that was the, you know, perceived wisdom that that was a fact—that that was how it was going to be.

While such lore might reflect concerns about ensuring normative fetal development, it also highlights the additional social pressures and judgments that trans gestational parents, in particular, may face as they engage in reproduction.

Participants' decisions about how long they needed to be off

<sup>5</sup> A teratogen is any substance or condition to which an embryo or fetus may be exposed, in-utero, which holds the potential to shape its current or future normative development (see [Alwan & Chambers, 2015](#) for a primer).

tosterone before trying to conceive were also steeped in ambiguity and advice from health care providers that could feel less based in science than in medical professionals' (re)assertion of authority. As one respondent told us: "The majority of folks I've spoken with ... a lot of people have had similar experiences where they've been given some arbitrary time frame, like, 'I will or I won't work with you unless you've been off T[estosterone] for X number of months,' or 'This is when I feel like it's safe to start trying,' or something like that." Their narratives highlighted the power and control that health care providers held as they made determinations about whether they would or would not provide care for trans patients.

Trans participants reported that some of their health care providers also made statements that were patently out of alignment with current medical research on testosterone administration, fertility, and the reproductive system. These advisements stemmed, in some instances, from lack of familiarity with the latest science on trans reproductive health and, in others, from earlier ambiguity and uncertainty in the science on trans reproductive health itself. For example, according to many participants, their health care providers told them, resolutely, that if they started testosterone they would not be able to have a child later. Indeed, one participant reported signing an informed consent form from their health care provider that stated taking testosterone would render them infertile. Another participant told us that his health care provider informed him that he would need a hysterectomy within two years of beginning testosterone therapy or would likely face cancer. As [Toze \(2018\)](#) describes, these non-evidenced assumptions have often formed the basis of standards of care for trans testosterone users.

Medical uncertainties around testosterone therapy during pregnancy and the postpartum period left participants with many unanswered questions. One participant wondered: "If I take testosterone, will that reduce my milk production? Will it transfer to my kid? I don't know. Again, we don't have any information on that because nobody lets cis women take testosterone and breastfeed. It's just not known." When asked if he would plan to stop taking testosterone if he planned to become pregnant, another participant stated:

Yeah, 'cause it is not good for the baby. Yeah, I think so. I don't know of any evidence that the hormone replacement therapy can affect the baby ... or not. But just according to my knowledge, what I grab on the internet, from my other trans peers, I think it's not good for, at the time that I'm pregnant. So, I'd have to stop that, I think. But in the future, if doctors said, 'No, you still can take that, they are not a problem with the baby,' maybe I would not stop. It's up to the information I have and the opinion and the development of the health service in that time, in that field.

Statements such as these reflected the status of medical uncertainty and knowledge-in-flux around testosterone therapy and pregnancy.

In order to make decisions despite these medical knowledge gaps and uncertainties, some participants drew upon cautionary tales, considering historical cases of hormone administration during pregnancy, and subsequent fetal harm, as reason enough for them to pause their testosterone treatment. For example, one participant discussed Diethylstilbestrol [DES] Syndrome, which involves a cluster of sequelae (e.g., heightened cancer risk, infertility, intersex conditions) experienced by the offspring of children born to a gestational parent who was prescribed DES, a synthetic form of estrogen, to prevent preterm pregnancy in the twentieth century. In the context of so many unknowns, participants described taking precautionary approaches, defaulting to testosterone administration cessation during pregnancy, and relying on health care providers and future research for key information about whether continuing testosterone administration is safe or unsafe for themselves and their potential offspring during pregnancy.

While expectations around pausing testosterone during pregnancy were nearly universal among both the trans patients and health care providers we interviewed, some trans participants expressed tensions

around these expectations or discussed how pausing testosterone affected them negatively or made them feel like they had less control over their own lives, which certainly was not inconsequential to their mental health. As one participant told us:

The experience of being off testosterone was so much more of a challenge, and so much more dysphoria-inducing than I expected it to be, that it has kind of like left me a little bit adrift almost—like shaken up. I didn't expect ... I didn't want to go on a journey in terms of my identity, and I just really underestimated how much that whole process would force me to do that, and sort of leave me feeling a bit more like ... I don't know. It's even hard to put into words now, but just kind of, yeah, more of an in-between type of person ... I feel like I've been forced to be different somehow ... Being pregnant wasn't the hard thing, being off T was the hard thing. I could've just been, like, a pregnant man, in the most straightforward sense of being myself, being on T, and being pregnant. That would've been fine. 'Cause I loved the feeling of growing this thing inside of me, and being ... having this incredible kind of responsibility.

When asked if pausing testosterone during pregnancy affected his transition, another participant

stated: "Yeah ... Toward the end of the pregnancy, I was all, 'I think I'm going to get back on

that, on the [testosterone] gel, in a few months' time. I'll feel better. I felt quite good when I was

on it." In such instances, trans people reported engaging in precautionarily pausing testosterone therapy for the sake of their pregnancies and offspring, even when doing so resulted in them not feeling their best.

One participant told us: "When I was 24, I knew I wanted to have a child but I knew I was not able to get pregnant, as a woman. It was not possible ... I knew I could not bear ... people—the view other people would have of me." In this participant's life history, their desires to take testosterone, live in the world as a man, be socially recognized by others as a man, and become pregnant were not inconsonant; rather, the possibility of being pregnant as a woman is what was seen as incommensurate with their wellbeing and sense of self in the world. This trans lifeworld, understanding of life possibilities, and vision for the future provides an important alternative to the cisnormative assumptions of some health care providers.

Under such social conditions, it is perhaps unsurprising that trans patients draw upon strategic and pragmatic approaches for meeting their own health and wellbeing needs and aims. For example, as one participant told us:

When you want to change your first name here ... or if you want to change your legal sex on a passport, you have to have two reports from psychologists stating that you are 'irreversibly trans'—always played with cars and never played with dolls—stuff like this. I didn't dare to say anything about that I wanted to have a child. I knew I wanted to get pregnant and I would manage to get pregnant but I never sought any support from [health care providers]. Because I did not think they would support me. I even feared they would stop me from doing that.

As another participant told us: "A lot of my relationship with medical care was really around telling people what they needed to hear for me to get the medical care that I thought that I needed rather than go into medical professionals for opinions and advice." Rather than being "selfish" or "blinkered," trans participants described engaging in strategic and pragmatic efforts to negotiate gatekeeping practices of the state and health care systems in order to obtain the services that they needed to ensure their present and future wellbeing and life possibilities in the context of cisnormative and transphobic sociomedical practices.

### 3.3. Harm-and-risk-reduction approaches: a potential pathway forward

#### 3.3.1. Providers consider new possibilities

Because nuanced and balanced harm-reduction approaches from health care providers, regarding the possibility of testosterone therapy during pregnancy and the postpartum period while chestfeeding/breastfeeding, were relatively rare in our study, we wish to provide extended interview excerpts from two providers who did offer such discussions. On questions about continuation of testosterone during pregnancy and the postpartum period, one provider told us:

I always do this thing where—everyone always, any presentation I go to they're just like, 'It's a teratogen,'—and when I'm presenting on it I'd say, 'We consider it teratogenic based on extremely limited data and conflicting data.' I think to some degree we can look at data on PCOS and pregnancy as a population of people that has increased testosterone levels, not as increased as they would be if you were taking a full dose of testosterone, and we see that there's some impact there but we don't change our pregnancy care. We don't try to reduce those testosterone levels. We just take care of the pregnant person ... I think it's probably not a great idea for people to stay on T when they're pregnant ... but I feel like we do this thing where we present the data, we present it with a lot more clarity than we actually have. What I'd really like to know more about in terms of testosterone is chestfeeding because a lot of people, in my experience, a lot of people I've talked to—patients or on social media or whatever, 'I'm totally good not being on T for the pregnancy. That makes sense to me but once I'm not pregnant anymore, I really want to be back on T but I also really want to feed my baby human milk and this is the way that I can do it.'

This health care provider's consideration of a risk-and-harm-reduction approach developed through practice-informed and trans community-centered observations.

Another health care provider we interviewed placed their concerns about a client taking testosterone during pregnancy in relation to the fuller spectrum of other concerns they may have:

Honestly, on my list of things that I'm worried about in pregnancy, it is so far down the list that I don't even go there. My patients have a higher-than-average rate of substance use, my patients have a higher-than-average rate of sexually transmitted infections, they have a very high rate of chronic stress related to marginalized status. Exogenous hormones are not my first concern. The fact that there's very little data is concerning, but we give people medications all the time that have very little data in pregnancy, so we can talk through what is known and what is unknown, and people make their decisions. But it's not something that I am prioritizing my anxiety about ... I just try to stick to the things that we can modify, that we have data on, and I'm very open with people that we don't know what the risks are, and this is what we will go forward with .... I have not come across anyone who was like, 'No, absolutely. I want to continue with testosterone.' But just given the data that we have, I just have a really hard time being hardcore about it, and I would never risk somebody out of care for that.

In this narrative, a provider confronts the reality that making unilateral decisions about discontinuing testosterone therapy during pregnancy holds the potential to cut patients off from health care they both need and deserve.

These providers' willingness to confront and seriously grapple with the existing uncertainty and ambiguity of the empirical data on testosterone therapy during pregnancy and the postpartum period, all while providing information, support, and care for trans pregnant patients, served as illuminating exceptions to the general trend to view any testosterone therapy during pregnancy and the postpartum period while chestfeeding/breastfeeding as verboten. In instances where health care providers have incomplete or conflicting empirical information about

whether a practice is risky or not (and may also not have reliable tools or markers for gauging the potential or actual health implications of various actions), trans patients typically bear the brunt of medical decision-making processes. In these contexts of uncertainty and ambiguity within the highly-gendered space of pregnancy care, advice to simply refrain from taking testosterone while pregnant or chestfeeding/breastfeeding may become the most likely fallback. However, such medical advice is also not without risk and potentially-negative health and well-being consequences for both trans people and their offspring (e.g., increasing the likelihood that a trans parent may cease chestfeeding or breastfeeding, choose not to pursue pregnancy, or cease testosterone administration while pregnant or chestfeeding/breastfeeding).

#### 3.3.2. Trans patient strategies

Given that health care providers are often ill-equipped to offer empirically-supported advice around pausing testosterone while seeking to conceive, as well as during and after pregnancy, many trans people report expending great effort to find providers willing to help them, or otherwise turn to community members for experience-based advice. Participants also described desires to use hormone therapies in ways that may not fully conform to one-size-fits-all, universalized assumptions about the "correct" dose of testosterone for all trans patients. As one participant said: "I had friends that took very low doses. They did not need a doctor to tell them, 'You have to take this amount, otherwise that's not good for health.' So I knew a lot of people who experimented with their doses. I knew it would be fine for me [too]."

One participant discussed his complex feelings about the possibility of maintaining testosterone therapy during pregnancy:

There's a bunch of research around androgen exposure in utero and intersex conditions and even some around stress hormones and cortisol and androgen and intersex babies. I did have a little bit of a complex feeling around working hard to *not* have an intersex child ... As someone who is a gender 'other,' to work hard to not create a different body that is a gender 'other,' it feels weird. It feels a little hypocritical. But it kind of came down to wanting the child I created to have the most options in their own body, in their own life, which most intersex folks don't have fertility open to them. But I had a lot of big feelings at the time around, okay, what does it mean to make sure that a child isn't exposed to androgens, and is this the right thing?

Another participant described not finding out that they were pregnant until they were ten weeks into the pregnancy and after taking three testosterone shots. This participant elected to pause testosterone upon learning of the pregnancy, but did so reluctantly and reported feeling a bit shaken by the experience: "When the testosterone had left my system, I felt ... I don't know, I just felt weird. I felt as weird as I did before [testosterone], but kind of worse, because I've got other hormones as well. So yeah, it was just not good." After the child was born, there were no apparent negative effects from the participant's testosterone use during the early weeks of the pregnancy.

A considerable number of participants we interviewed reported struggling with postpartum depression, some experiences of which may be confounded by potential or actual delays in returning to testosterone therapy following the birth of their children. As one respondent reported:

The only way I can describe it is that before testosterone my mood [and] feelings very much felt like a rollercoaster ... my lows were miserable, depressed, to the point of suicidal lows, and the highs didn't really compensate for that. And testosterone just leveled it out, it kind of normalized my feelings ... I actually felt like I had some control over how I felt rather than being at the mercy of it ... I was also experiencing some depression after having [my daughter] and I knew that going back on testosterone would help. I didn't really know whether [my doctor] would be happy to re-prescribe me testosterone ... and there was a fear there that it would be withheld from me. I

must admit that was a big concern of my mine that they were going to say, 'Well, sorry, you came off it, you're not getting it back.'

Harm-and-risk-reduction approaches, therefore, must attend to the importance of health provider and patient communication given trans patient experiences with providers as gatekeepers.

Another participant discussed working to seek information about whether being on testosterone while chestfeeding would be safe, after not finding useful information from several health care providers. They said:

Most of them [health care providers] didn't even *want* to know whether I can chest-feed and take testosterone ... They said, 'Why don't you stop chestfeeding?' And I said, 'Why should I? If this is my child's need and my need is to take testosterone, why isn't it possible to do both?' And then I met one lactation specialist and she was interested and wanted to know and started to do some research. And then she told me, 'Yeah, you can do that, go ahead.'

Their lactation consultant's stated rationale for this advice was that children do not yet have active hormone receptors, so exposure to human milk with higher concentrations of testosterone should not result in negative consequences. While they were not ultimately sure about the accuracy of this advice – "I don't know if this is really true because then later I read something different" – they pursued a risk and harm-reduction approach, and reduced their testosterone dosage during the time that they were chestfeeding their child. There were no apparent ill effects on their child during or after this period.

These precautionary risk-and harm-reduction approaches seek to attend to the health and well-being of both trans people and their children. Such approaches differ meaningfully from gendered and normative expectations that gestational parents must always and automatically self-sacrifice or choose optimal approaches that exclusively prioritize the potential well-being and normative development of offspring. Some of these risk-and-harm-reduction approaches may also usefully illuminate and address existing sex binarization in medical systems, tools, and measures. For example, when one participant requested that their doctor perform a blood test to ensure that their child wasn't being negatively affected by testosterone exposure through their milk, their doctor refused: "The doctor did not agree on doing a blood test because they said they could not test it—or maybe they didn't want to but ... They said they can test it but they said they don't have a norm. They need to have a norm to compare it to, otherwise they can't say whether it's more or less."

Respondents often described negotiating with health care providers about their resumption of testosterone as they also faced pressures to chestfeed (or not), coped with sleeplessness and the dizzying transition to parenthood, managed gendered social expectations around parenthood, and sometimes struggled with postpartum depression or complications of childbirth. This period was often described as a particularly vulnerable time during which their bodies and minds were both exhausted, and advocating for their own needs and wellbeing was even more confusing and challenging. Future harm-and-risk-reduction research might usefully explore effective conception, pregnancy, and postpartum medical educational curriculum and care practices that offer opportunities for the development of more holistic, community-engaged, and inclusive support for trans gestational parents, offspring, and families.

#### 4. Conclusion

Sex hormones are often misunderstood as the dimorphic chemical building blocks of gender. The lessons that we can learn from medical authorities' work to manage and regulate access and use of such hormones, however, suggests that the case is much more complicated. Indeed, there is much to learn about gender, medicine, and biological and social reproduction if we are willing to ask different questions. We find that the medical science around the potential effects of gestational parent testosterone therapy on fetal development in-utero or infant secondary

exposure during the postpartum period (e.g., via chestfeeding/breastfeeding) remains nascent at best (Oberhelman-Eaton et al., 2021). Previous research repeatedly demonstrates how ambiguity and uncertainty is associated with authority-(re)establishing practices that may either intentionally or inadvertently involve stigma, discrimination, and poor care (Doan & Grace, 2022; Freeman, 2015; Poteat et al., 2013; shuster, 2019, 2021) and gendered precautionary practices that work toward avoiding potential risk through protecting embryos, fetuses, children, and families above all else (MacKendrick, 2018; Waggoner, 2017).

In this context of medical ambiguity and uncertainty in the hyper-gendered context of pregnancy and lactation care, both health care providers and trans patients engaged in precautionary approaches that prioritized potential fetal and infant health and wellbeing (and imaginaries concerning future offspring's normative development) over adult trans patient health (particularly mental health) and wellbeing in the present. Health care providers also worked to dispense health care recommendations and edicts in ways that (re)established their expertise and authority. These precautionary and expertise/authority-(re)establishing approaches had the result of shoring up social constructions around binary conceptualizations of sex and sex hormones and was driven, in their explanations, by a focus on attempting to (re)produce normative bodies and people.

Considering the co-occurring uncertainty and epistemic authority of medical providers working with trans pregnant clients, who have primary control over dispensing prescriptions for hormone treatments and advice on their use in the context of pregnancy, is imperative when examining processes whereby trans people make decisions that weigh their own mental health and well-being against the potential health and well-being of their offspring. Importantly, these processes do not occur within a social vacuum. As shuster (2019: 196) notes: "Underpinning trans medicine is the inescapable fact that providers are working within gender-specific medicine. Gender normative expression becomes a lens through which providers make distinctions of 'good' and 'bad' patients." As such, part of being a "good" pregnant or chestfeeding/breastfeeding patient, as a trans person, is suspending use of testosterone, even if it may involve significant negative consequences for one's own mental health and well-being.

Part of being a "good" doctor, too, involves rule-following and precaution in the context of medical practice in order to meet expectations of professionalism. As Timmermans and Almeling (2009:26) write: "Any actual course of action should thus be viewed and studied as a locally situated accomplishment: rules are not simply pre-set abstractions but become part of working professionally." Indeed, few medical professionals receive comprehensive training on trans pregnancy care and are left to rely, instead, on standards and norms created with other groups or within other bureaucratized systems, underlining the importance of attending to interpersonal negotiations and structural competency in medical education and health care institutional contexts involving trans patients (Cruz, 2014; Kirkland, 2021; White Hughto, Reisner, & Pachankis, 2015; Willging et al., 2019). The precautionary focus on the normative development of trans people's offspring was shared among both patients and their providers.

The logics guiding current medical advice around precautionary testosterone cessation in pregnancy involve potentially troubling assessments of the sorts of risks testosterone exposure in the prenatal and postpartum environments may pose for later child and adult development: namely, potentially heightened likelihoods of autism, obesity, intersex conditions, being lesbian and/or trans. In this way, precautionary practices of protecting the offspring of trans people become, paradoxically, a method of social control through safeguarding against reproduction of some of the very same characteristics held by some trans parents themselves. It also raises the specter of panoptics of the womb and epistemic injustice as it simultaneously reflects elevation of the epistemic authority of medical professionals and erosion of the epistemic privilege of trans gestational parents (Freeman, 2015).

We also find that, despite relatively standard precautionary medical



advice for trans people to stop or pause testosterone administration prior to conception, during the gestational period, and across the duration of chestfeeding/breastfeeding, there remains little empirical evidence guiding this advisement, particularly in the context of testosterone microdosing. As Shuster (2016, p. 321) notes: Much of trans medicine has been built on the assumption of binary genders ... [T]rans people's understandings of their selves and bodies have become more fluid, and 'cross'-gender transitioning is not always the ultimate goal." Indeed, future medical research might approach continuation of testosterone during pregnancy among trans people not as a binary yes/no question or a topic to approach for the purpose of developing one-size-fits-all medical standardization (Timmermans & Almeling, 2009), but one that investigates the potential impacts (on trans patients and their offspring) of continuing various dosages of testosterone across pregnancy. In an interesting shift, the aforementioned "recommendations" against use of testosterone during pregnancy and chestfeeding in the current WPATH *Standards of Care* (Coleman et al., 2022) reflect a marked softening in language from the previous edition published a decade ago, which stated that "absolute contraindications to testosterone therapy include pregnancy" (Coleman et al., 2022, p. 45).

We can understand medicine's refusal to consider the possibility of trans people continuing testosterone during pregnancy to be a striking example of what Paine (2018) has described as *embodied disruption*, "how patients' embodied nonconformity to binary medical constructs disrupts ordinary medical interactions, and how provider reactions prevent GNC [gender non-conforming] patients from meeting their health needs" (p. 357). We argue that health care providers' precaution-focused labor in this highly-gendered context of pregnancy care seems driven largely by their concerns about producing normative offspring rather than non-normative gestating patients themselves (see also Waggoner, 2017). Our work also reveals that these practices of biological and social (re)production are not solely the domain of women or those who are pregnant.

Drawing upon sociological theorizing around social control, normativity, risk, and precaution, in this work we further consider just what is at stake as health care providers and trans people interface, in the context of pregnancy, to make decisions around testosterone administration and use. This case provides an opportunity to consider how these medically managed and often highly consequential decision-making processes emerge in a highly-gendered context of pregnancy care steeped in incomplete and conflicting empirical medical evidence. Of particular focus in this work is the question: Which needs and whose well-being are protected (and challenged) as these decisions are made, and to what potential personal and social consequences?

Through working to consider alternate possibilities for current medical practices around the recommendation to precautionarily pause testosterone during pregnancy, there may be opportunities to develop health care practices for trans people that better meet their mental and physical health care needs using more tailored approaches. Indeed, similar considerations have already been made when determining whether and how to use potentially-teratogenic medications to treat various physical and mental health issues among those who are pregnant (Angelotta & Wisner, 2017; Given et al., 2018). As Timmermans and Almeling note: "The point is not to presume stable and universal health care goals but to document who aims for what kind of outcomes under which circumstances and then to examine what kinds of actions are made possible to reach these goals" (2009:27). This work aims to make room for further consideration of testosterone therapy during pregnancy for trans people, with a call to more fully consider their mental and physical health alongside predominant precautionary approaches for safeguarding the normativity of their offspring. Doing so attends not only to the social control functions of working to prevent non-normative bodies and people, and the artificial binarization of sex and gender in medicine and society, but also that between mental and physical health as it insists upon increased attention to the mental health concerns and well-being experienced by trans people before, during, and after pregnancy.

## Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: The research described herein was funded by a grant (ES/N019067/1) from the Economic and Social Research Council. The funder played no role in the study design, data collection, analysis and interpretation of data, writing of study reports, or decisions about where to submit reports for publication.

## Acknowledgment

The authors wish to acknowledge Nik M. Lampe, who worked to assist with data coding, as a Graduate Research Assistant on this project. Please add the following keywords: eugenics; families; health; LGBTQIA+; medical education; uncertainty; pregnancy; social control; social determinants of health; testosterone; transgender.

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