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# For Women Only? Reconsidering Gender Requirements for Uterine Transplantation Recipients

Darren N. Wagner

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Article abstract

Uterine transplantation is an experimental procedure currently available only to cisgender women recipients suffering from absolute uterine factor infertility. Clinicians, researchers, and advocates have advanced the possibility of providing these quality-of-life transplantations to transgender women. This article examines the ethical and practical implications of removing sex- and gender-based requirements entirely for uterine transplantation recipients. Given the significant costs and risks, and the modest quality-of-life benefits, ethical arguments against offering uterine transplantations to people who do not identify as women but are otherwise suitable recipients are dubious and prejudicial. Successful uterine transplantations with non-women recipients could potentially diminish the socio-cultural connection between uterine functionality and womanhood, which is a key motivation for women now seeking this high-risk procedure.

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**ARTICLE** (ÉVALUÉ PAR LES PAIRS / PEER-REVIEWED)

# For Women Only? Reconsidering Gender Requirements for Uterine Transplantation Recipients

Darren N. Wagner[a]

**Résumé**
La transplantation d'utérus est une procédure expérimentale qui n'est actuellement disponible que pour les femmes cisgenres souffrant d'une infertilité utérine absolue. Les cliniciens, les chercheurs et les défenseurs ont avancé la possibilité de fournir ces transplantations de qualité de vie aux femmes transgenres. Cet article examine les implications éthiques et pratiques de la suppression totale des exigences liées au sexe et au genre pour les receveuses de greffe d'utérus. Compte tenu des coûts et des risques importants, et des avantages modestes en termes de qualité de vie, les arguments éthiques qui s'opposent à ce que des transplantations d'utérus soient proposées à des personnes qui ne s'identifient pas comme des femmes, mais qui sont par ailleurs des receveuses appropriées, sont douteux et préjudiciables. Des transplantations d'utérus réussies avec des receveuses qui ne sont pas des femmes pourraient potentiellement diminuer le lien socioculturel entre la fonctionnalité de l'utérus et la féminité, qui est une motivation clé pour les femmes qui recherchent aujourd'hui cette procédure à haut risque.

**Mots-clés**
transplantation d'utérus, éligibilité du receveur, exigences de genre, cisgenre, transgenre

**Abstract**
Uterine transplantation is an experimental procedure currently available only to cisgender women recipients suffering from absolute uterine factor infertility. Clinicians, researchers, and advocates have advanced the possibility of providing these quality-of-life transplantations to transgender women. This article examines the ethical and practical implications of removing sex- and gender-based requirements entirely for uterine transplantation recipients. Given the significant costs and risks, and the modest quality-of-life benefits, ethical arguments against offering uterine transplantations to people who do not identify as women but are otherwise suitable recipients are dubious and prejudicial. Successful uterine transplantations with non-women recipients could potentially diminish the socio-cultural connection between uterine functionality and womanhood, which is a key motivation for women now seeking this high-risk procedure.

**Keywords**
uterine transplantation, recipient eligibility, gender requirements, cisgender, transgender

**Affiliations**
[a] Health Law Institute, Faculty of Law, University of Alberta, Edmonton, Alberta, Canada
**Correspondance / Correspondence:** Darren N. Wagner, dwagner@ualberta.ca

## INTRODUCTION

Nearly a decade since the first successful attempt, and after more than 70 reported procedures and 23 live births (1), there remain many unresolved ethical issues in human uterine transplantation (UTx). One of the more contentious issues is the criteria for eligible UTx recipients. In 2012, a group of clinician-researchers based at McGill University published "The Montreal Criteria for Uterine Transplantation," – referred to here as "Montreal Criteria" – outlining requirements for the procedure's proper conditions and patients (2). Eligible UTx recipients are genetic females[1] of reproductive age who suffer from absolute uterine factor infertility (AUFI), a condition estimated to affect about 1 in 500 women of childbearing age (1). In 2019, a UK-based research group published an argument that the procedure could clinically and ethically be offered to male-to-female transgender women (3). In 2021, researchers offered a proof-of-concept paper about the possibility of transgender women UTx recipients (4). In the same year, one of the authors of the Montreal Criteria co-wrote a revised ethical framework – referred to here as "Revised Criteria" – for UTx that expanded the category of eligible recipients to include transgender women (5). This change in the ethical framework for UTx purports to reflect shifting gender norms in sexual and reproductive medicine, which the authors of the Revised Criteria refer to as "advancing social circumstances" (5).

However, the justification for UTx is already tenuous, given the significant risks and costs, and the relatively modest quality-of-life benefits that correspond to patients' desires, expectations, and perspectives. Considering this context, UTx eligibility criteria that exclude a particular sex or gender would need a substantial technical justification or risk criticism for such discriminatory policy. Here, I explore whether these gender requirements can be justified with sound reasoning and evidence, and, if not, whether they should be discarded. In other words, I am asking: *should individuals who are neither cisgender women nor transgender women, but who otherwise meet all other clinical criteria, be eligible UTx recipients?* I argue that cisgender men, intersex people, nonbinary people, and transgender men – all of whom I collectively and inclusively refer to here as "non-women" (i.e., anyone who is neither a genetic female nor a self-identifying transgender woman) – should not be categorically deemed ineligible for UTx without absolute technical obstacles. Rather, given the modest, subjective benefits and considerable

[1] I note that "genetic female" is a technical term commonly used in scholarship on UTx eligibility. Here, when discussing transgender women, I adopt the terminology of cisgender women for parity's sake.

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risks and costs associated with UTx, non-women recipients should be welcomed as possibly decoupling the problematic association of uterine functionality with womanhood.

My analysis suggests that gender-based restrictions have little ethical foundation and undermine a potentially valuable contribution to the "advancing social circumstances" surrounding infertility and gender identity. Much of the justification for the therapeutic effects of UTx depends on socio-cultural norms and expectations. Without substantial technical obstacles or significantly more negative outcomes for non-women recipients, UTx procedures should not be made wholly inaccessible to that group. Indeed, part of the significance of UTx is its potential to separate reproductive capability from womanhood. Put differently, expanding UTx eligibility to include any sex or gender could effectively queer gestation (6-8).[2] This queering could alleviate the very socio-cultural expectations about uterine fertility that inspire much of the motivational desires, identity issues, and psychological harms in patients now seeking UTx.

This paper first details the context of UTx with a brief history and the current state of the field. I then outline some of the major ethical and policy issues special to UTx before examining how researchers have addressed gender criteria for UTx recipients. I explain the medical risks and therapeutic benefits of UTx to highlight the fraught ethical argument against widening the eligibility requirements to include non-women recipients. As stated, my thesis – that gender requirements for UTx recipients should be removed because they are ethically unjustifiable and socially undesirable – is framed by the specific social and medical contexts of UTx. For this purpose, I thoroughly discuss the risks and benefits of UTx. Any ethical analysis about the provision of a healthcare intervention like UTx must address the remarkable cost-benefit equation. I also presume that readers have varied background knowledge of UTx; therefore, I describe how the experimental procedure works and flag contextual details for the readers' benefit. I conclude by arguing against any strict gender- or sex-based criteria and suggest that the broader social value of UTx is the promise of decoupling gender statuses from reproductive functions.

## A BRIEF HISTORY

Most scientific and philosophical articles published on UTx begin with a brief twenty-first-century history of the operation; rarely do they mention that the first such operation was performed on Lili Elbe, a Danish transgender woman who received a UTx in 1931 and tragically died shortly after from complications (9). Rarer still is a cultural history of the procedure, which predates modern medicine by many centuries. Indeed, the notion of a surgical operation to enable gestation can be traced back at least to the Greek myth of Zeus birthing Athena (10), through ideas of male-births in the Enlightenment (11), and into today's research on extracorporeal gestation (12). These omissions in the current medical narrative surrounding UTx highlight two salient points: the desire to gestate is deeply cultural and is not specific to one sex, gender, or vision.

Elbe's catastrophic procedure appears to have been followed by a decades-long pause in recorded UTx trials and experiments (9). Despite Elbe's significant place in the history of UTx, ethicists, scientists, and clinicians commonly recite a story that begins in Saudi Arabia in 2002 with the first *recent* attempted human UTx (13).[3] That graft had to be removed after necrosis set in. A Turkish team ventured the second recent attempt, which had a successful graft that led to three subsequent but unsuccessful pregnancies. In 2008, the ethics committee of the International Federation of Gynecology and Obstetrics (FIGO) classified UTx as an unethical procedure due to a lack of safety and effectiveness data (13). Then, in 2014, a Swedish team achieved a UTx breakthrough in a trial that included nine recipients with living relative donors (14), resulting in the first live birth and eight subsequent successful deliveries (15). Preceding this first successful attempt, researchers had conducted UTx experiments since at least the 1950s on several animal models (13), including mouse (16), rat (17), hamster (18), rabbit (19), dog (20), sheep (21,22), pig (23), and baboon (24). Even today, would-be UTx surgeons typically train on test animals for years before attempting a human operation (25). Despite costliness, riskiness, and ethical complications, many teams in diverse contexts have attempted the procedure, including national settings like China, US, Czech Republic, Brazil, Serbia, Germany, and India (25).[4] A cursory review of news media coverage of UTx shows distinct positivist and pronatalist themes, similar to those appearing in the scientific literature on UTx (26,27). For example, a headline from *USA Today* reads "Woman Born Without a Uterus Births 'Miracle Baby' after Transplant. Now She Offers Hope" (28). Notwithstanding these glowing headlines, ethical objections to UTx persist (13).

## CURRENT STATUS AND PROMISE

UTx remains an experimental treatment but promises to soon become clinically available. While the indications for UTx recipients vary slightly between countries (25), all twenty-first-century clinical trials have required the recipient to be a genetic female with no medical contraindications to transplantation (29). The patient group is further defined as women without a uterus or with a non-functional uterus, which is estimated to represent 1.5 million women globally (30). This recipient group includes those with uterine agenesis, peripartum hysterectomy, hysterectomy for cancer, Mayer-Rokitansky-Kuster-Hauser (MRKH) syndrome, hysterectomy for benign pathologies, acquired uterine factor infertility, complete androgen insensitivity syndrome, and diethylstilbestrol exposure (25). One review study found that the median age of UTx recipients is 28 years (25); by contrast, a US survey revealed that 64 percent of women actively seeking UTx had acquired uterine factor infertility and a mean age of 33 years (25). Notably, there is a significant psychosocial component to meeting UTx eligibility requirements, as all recipients

[2] Wary of overburdening this article with feminist and queer scholarship, I am limiting my references on this point to useful entries into that robust field of criticism.
[3] Unique among all papers I reviewed, Zaami et al. note that the first attempt for a human female recipient occurred over 40 years ago, which happened "in the same Cape Town hospital where Cristian Barnard performed the first heart transplant," with the notable difference that the UTx "outcome was disastrous" (13).
[4] Many UTx programs and procedures were paused during the COVID-19 pandemic. I know of no active UTx program in Canada.

were deemed to be “emotionally stable” and have “durable relationships” (25). The primary motivation for women with AUFI seeking UTx is “the experience of pregnancy” (1).

UTx is a distinctive medical treatment that combines assisted reproductive technology (ART) with a quality-of-life (QoL) transplantation.[5] The procedure consequently engages two complex fields of medical ethics and regulation. Generally, ARTs are designed to treat difficulties in conception rather than gestation, which UTx provides (31). However, the UTx procedure also involves other ARTs such as *in vitro* fertilization (IVF) and embryonic implantation, which are integral to producing a post-transplant pregnancy. Typically, a single embryo transfer is performed six months after the UTx, which allows for surgical healing and a stabilized immunosuppression regime;[6] either vitrified or fresh embryos can now be used for implantation (1). For those who successfully gestate, delivery is by Caesarean section.

The transplantation procedure involves relatively lengthy and risky operations for donors and recipients. While currently not considered optimal, the use of dead donors resolves many risks and might represent a better option in the future. Live donors, who are typically family members or friends (25), undergo comparatively longer surgeries that average over eleven hours (31) but can be completed in as little as six hours (25). As some researchers highlight, UTx donors could potentially benefit from minimally invasive surgery by means of robotic-assisted laparoscopy (32). The operative time for recipients ranges from four to eight hours (22), and averages slightly above four hours. The recipient surgery involves a sub-umbilical midline incision. The vaginal vault is opened, and the graft is anastomosed to the vagina. The graft is then fixed and immobilized by attaching uterine ligaments to pelvic counterparts (32). A key component of successful transplantation is the vascular anastomosis for the graft’s blood supply (33).[7] The recipient is given long-term monitoring and kept on a regimen of immunosuppressives and antibiotics to maintain the graft, including before and during implantation and gestation. Unique to UTx, the graft is ephemeral as it is intended to be removed following completion of the desired number of gestations and deliveries. Discussions among researchers have recently emphasized the potential of UTx as part of the surgical interventions for gender affirmation in transgender women (3).

## OVERVIEW OF ETHICAL ISSUES

UTx raises several ethical issues and engages many policy frameworks. The primary ethical issues include: 1) UTx’s status as a QoL transplantation (versus lifesaving transplantation); 2) the viability of alternatives for attaining parenthood such as adoption and surrogacy; 3) the risks for donors, recipients, and potential future children; 4) the costs and benefits for public healthcare and allocation of scarce health resources; and, the ultimate focus of this analysis that is specifically addressed in the subsequent section, access to the procedure. This purpose of overview is to acquaint the reader with the ethical landscape of UTx before advancing my argument that sex and gender requirements for UTx patients are ethically unjustifiable and socially undesirable. The argument here is that, given the tenuous ethical footing for UTx and the arbitrariness of sex/gender requirements for recipients, it is extremely difficult to justify making this procedure available to one class of recipient and not another.

If the procedure becomes clinically available, UTx will engage multiple medical guidelines and frameworks. In the UK, for example, it will be subject to such regulatory frameworks as the *Human Fertilisation and Embryology Act 1990*, the *Human Tissue Act 2004*, and the *Human Organ (Deemed Consent) Act 2019* (30). By comparison, clinical UTx in the US will engage the *National Organ Transplant Act*, the *Fertility Clinic Success Rate and Certification Act*, and several state-level regulations (34). If UTx were to be adopted in the Canadian context, regulatory frameworks that will be engaged include the *Safety of Human Cells*, the *Tissues and Organs for Transplantation Regulations*, the *Assisted Human Reproduction Act*, and provincial regulations for organ donation and transplantation.

### 1) Non-Lifesaving

Most organ and tissue donation and transplantation programs focus on critical or lifesaving procedures like heart, lung, and liver transplantations. Other transplant organs, such as kidneys, can be variously described as lifesaving, life-extending, or QoL enhancing. Others still are purely QoL interventions, including face, hand, corneal, larynx, penile, and uterine transplants. These kinds of transplants are ethically justified as enriching, rather than lifesaving (35). Of course, not all QoL transplantations offer the same therapeutic value. The impact of any type of procedure, on any given patient can, and should, be scored relative to costs and risks (36). Understanding what UTx achieves for different patients is crucial to determining the procedure’s ethical grounding and designing appropriate eligibility and resource allocation guidelines.

As described above, the primary motivation for those seeking UTx as opposed to other potential routes to parenthood is the experience of pregnancy (1). A secondary motivation is biological parenthood; however, there can be alternatives to attaining such an end depending on the socio-legal setting. A tertiary motivation, which applies differently to cisgender and transgender women, is gender identity affirmation (37). These QoL outcomes for UTx – the experience of pregnancy, biological parenthood, and gender identity affirmation – inform who is indicated as an appropriate UTx recipient. Crucially, non-women may readily share the first two goals. However, the inclusion of non-women as recipients could complicate how others perceive the third

[5] Procedures with similar combinations might include gonadal and penile transplants.
[6] Potentially teratogenic immunosuppression is stopped well before embryo transfer.
[7] Due to the amount of vasculature and ligamentous material excised and grafted, there is some debate about whether UTx is properly categorized and regulated as a vascular composite allograft or a solid organ transplant.

goal – gender identity affirmation. Successful UTx in non-women would challenge the conventional understanding of the uterus as a reproductive organ exclusive to women (38). This effect could be valuable in a broader social context, as the normalization of non-women as gestational carriers could alleviate the oppressive connotations that some people identify with uterine functionality and female identity (39).

The therapeutic rationale used to justify UTx is a subjective QoL improvement derived from social perspectives about pregnancy, parenthood, womanhood, and female reproductive bodies. For an individual, infertility is only harmful when certain desires and expectations exist. For those who do not want to have children, infertility can be a positive or neutral characteristic (40). However, in most medical and public contexts, infertility is regarded as a medical condition, which ascribes negative connotations to that relatively common characteristic.

The psychosocial parameters of UTx are clearly evidenced by the design and significance of recipient evaluations. Interviews of potential recipients are routinely multidisciplinary and focus on six domains: psychological well-being, relationships, managing childlessness, knowledge about UTx, relationship with the donor, and risk (25). Selected couples are deemed psychologically stable and experienced in handling difficulties together (25). Key areas of evaluation are the patient's history of compliance to medical regimens, body image, past adaptation to trauma, reasonable expectations, and adaptive coping skills (25). These requirements are designed to ensure the recipient will gain QoL benefits that supersede the procedure's inherent risks, including the risk of failing to achieve a viable pregnancy.

## 2) Alternatives

Much of the QoL improvements represented by UTx are the result of social, cultural, religious, political, and legal contexts. There is no discrete somatic condition being treated by UTx: no physical pain, no morbific origin, and no measurable impact on life expectancy. Rather, UTx is likely to negatively affect patients' disability-adjusted life years; and mental health conditions related to infertility are highly dependent on socio-cultural contexts.

UTx responds to a perceived missed opportunity that arises from the absence of a functional uterus. Part of that missed opportunity relates to biological parenthood and its associated experiences, meanings, and customs. Tellingly, those national contexts that first championed UTx experimentation in the twenty-first century have either predominant religions that emphasize biological parenthood (e.g., Saudi Arabia and Turkey) or legislation that prohibits surrogacy (e.g., Sweden). In many other nations, less-invasive, less-expensive, and lower-risk routes to parenthood like surrogacy and adoption have been stymied by legal and regulatory barriers (40). Canada, for example, prohibits commercial surrogacy, offers little legal framework to support altruistic surrogacy, and has a negligible amount of healthcare guidelines dedicated to surrogacy (41). Such restrictions on attaining parenthood experiences exacerbate the motivations for those pursuing UTx.

In counselling potential recipients, the leading British UTx team notes that consideration must be given to adoption and surrogacy (1). Yet, some academic literature on UTx exaggerates the limitations faced by women with AUFI and inaccurately suggests that, in the absence of motherhood through surrogacy, "uterine transplantation is the only way to parenthood" (25). Others laud UTx for potentially diminishing "the phenomena of 'wombs for rent'" associated with surrogacy (37). These arguments reveal something disingenuous about the described need for UTx as a therapeutic option. UTx is a medical intervention representing one of several possible solutions to achieving a parenthood status. Given the significant risks to recipients and donors (and potentially the child), the steep costs in terms of health resources, and the modest subjective benefits, UTx is an ethically questionable procedure. My analysis demonstrates some of the overpromise and misrepresentation in how researchers and exponents have described UTx as the only route to motherhood or parenthood for some people. Here, I offer a brief discussion about adoption and surrogacy merely to show the existence of alternatives to UTx for the purpose of realizing parenthood. There are notable problems associated with adoption and surrogacy. However, I maintain that – given the relative risks, costs, and benefits – UTx is difficult to justify as a route to parenthood.

Justifications for UTx often reflect socio-cultural factors that should rightly be scrutinized as with any other medical intervention using limited resources. Nonetheless, the motivation of some patients to achieve a type of parenthood within certain parameters and through surgical means remains valid and deserving of medical and ethical consideration. Participating in a UTx trial, which is ostensibly free for patients, may represent the only financial, legal, practical, and desirable option to realize biological parenthood for some patients, despite the risks.

## 3) Risks to Donors, Recipients, and Children

Until there are more viable and available artificial grafts or xenotransplantations,[8] a perennial issue in transplantation will remain how best to secure reliable donations from appropriate, informed, and consenting donors. In the context of UTx, researchers, ethicists, and clinicians continue to debate who is an eligible and preferred donor (35). Both living and deceased donors have been used for UTx procedures (25).[9] To date, there have been more successful UTx procedures and subsequent deliveries using transplants from living donors. As of 2018, only three deceased donor uterus transplantations were reported and only one led to successful delivery (25). While it is known that better outcomes are achieved with living donors of other

[8] Notably, artificial uteruses for extracorporeal gestation or "exowombs" are a nearing advancement, which would also provide another route to biological parenthood.
[9] Favre-Inhofer et al. also detail inclusion and exclusion criteria for deceased donors. Deceased donors for UTx must exhibit brain death but not cardiac death.

solid organ transplants, it is still unclear whether that correlation applies to UTx, or whether nulliparous or parous donors are preferrable (1,31).

The availability of eligible deceased organs is more limited and time sensitive. A further complication is that uterine retrieval could adversely influence the multiorgan retrieval process in deceased donors. Some aspects of the retrieval process are easier with deceased donors; however, the ischaemic times and brain-dead-related inflammation could affect the graft's functionality (1).

The organ retrieval process in living donors presents significant surgical challenges and risks. Such risks include urinary tract and bowel injuries, bleedings, vaginal cuff dehiscence, and many others (25). For QoL transplantations, only UTx and ovary transplants have been approved for living donors (35). This exception for UTx and ovary transplants likely reflects the relative commonness of hysterectomies and the related perception of these organs as a readily excisable (42). Currently, prospective living donors undergo extensive assessments, including ultrasonographic scans, human leukocyte antigen compatibility tests, blood tests, and examinations by specialists (25). Of the small cohort of UTx living donors, several sequelae and injuries have been reported. After the retrieval operation, living donors typically remain in hospital for post-operative recovery and observation for five to seven days (25).

The significant risks incurred by UTx recipients and their potential future offspring necessitate ongoing vigilance and care on the part of healthcare providers (43). For transgender women patients, there are added risks due to additional uncertainties related to gestating in a genetically-male body (4). One potential source of donor organs could be transgender men undergoing hysterectomies (4). For all potential recipients, fully informed consent and extensive patient counselling is needed to minimize harm and ensure the best results.

## 4) Costs and Benefits

UTx is a resource-intensive procedure, involving a series of evaluations, surgical operations, a combination of ARTs, and long-term post-operative treatment. To date, UTx procedures have been conducted within experimental programs exempt from usual health resource analyses. As a clinical option, UTx might remain outside the purview of many public healthcare systems due to its relatively high costs, high risks, and limited QoL outcomes.

Nevertheless, some surveys suggest that UTx will receive public support as a clinical therapy. One such survey found that the US public generally favours UTx as a treatment for AUFI. Of the 1247 respondents included in the results, 70% believed pregnancy was a human right, 66% believed UTx to be an acceptable alternative to "gestational carriers," and 67% believed UTx to be ethical (44). Notably, 45% of respondents thought UTx should be covered by insurance (44). Another study, which surveyed members of the social media group Beautiful You MRKH Foundation (n=281), found that 78% of respondents who considered pursuing UTx believed that health insurance should cover the procedure (41). The survey study concluded that there is a demand for available and affordable UTx in the MRKH community and emphasized that patients considering UTx have special vulnerabilities requiring extra attention to informed consent and evaluation (37,43,45).

Despite the inherent weaknesses of these survey studies, they show that expectations about the availability of UTx differ between survey groups. Again, the social context of infertility is critically important. Recall that the parenthood experience provided by UTx only differs from safer, more readily justified forms of assisted routes to parenthood – such as the less-resource-intensive procedure of surrogacy and the more-ethical option of adoption – in the gestational capacity and genetic properties. Adoption provides stable, caring, and permanent families for children who might otherwise be deprived of such crucial benefits and advantages (46). Surrogacy represents a relatively less-resource intensive option for would-be parents to make a family and provides financial benefits for surrogates (47,48).[10] While keeping this discussion necessarily brief, I contend that adoption and surrogacy represent potentially favourable alternatives to UTx, ethically speaking.

Aside from situations where alternative routes to parenthood are unavailable, Utx is responding to a narrow category of patient motivation: a desire for gestational parenthood. I know of no research suggesting that the desire for this kind of parenthood is an inherent trait rather than a psychosocial phenomenon. For those desiring Utx as a route to parenthood, the harms of infertility can be described as encultured. To what degree, then, should scarce health resources be dedicated to meeting socio-culturally derived desires and ameliorating subjective harms from infertility? Are there alternatives or ancillary options that are less resource-intensive and less risky, such as psychological therapy and educational programs? This line of criticism also applies to other ARTs, such as IVF, which represent significant costs for personal finances, health resources, and psychological wellbeing.[11] For these reasons, counselling prior to IVF treatments, for example, is required in many jurisdictions. The emergence of UTx might prompt those nations that prohibit or restrict surrogacy and adoption opportunities to reconsider their rules and regulations and, ultimately, explore crafting more supportive and protective frameworks (46,49,50).

Even where Utx treatments would not worsen already scarce public healthcare resources, it remains uncertain whether such an invasive and risky procedure should be promoted. The risks assumed by the recipient are compounded by the additional risks posed to the donor and prospective children (29). All these cost-benefit analyses lead to a central question advanced by political philosopher Emily McTernan: "what is the value of gestation and how should we respond to that value?" (51). It seems

[10] For a discussion of the social benefits and problems involved with commercial surrogacy, see van Niekerk and van Zyl's debate with McLacklan (47,48).
[11] Whether other infertility problems might be better culturally understood and addressed through non-medical interventions is beyond the scope of this paper.

unlikely, even with operative advances, that UTx will be justifiable as a publicly funded treatment given the obligations to nonmaleficence and the modest[12] therapeutic value of experiencing gestation (51). Considering the relative risks, costs, and benefits, UTx invites ethical criticisms and prohibitive guidelines that will limit access. Such limits will hopefully prevent UTx from becoming a consumer-driven medical trend. However, as McTernan concedes, UTx will not likely be banned outright (51). Conversely, medical ethicist Timothy Murphy contends that there is no reason to exclude UTx research from public expenditure, including UTx applications for transgender women and non-women recipients (40).

UTx and related pregnancies pose known and unknown risks to recipients and their potential children (37). As an experimental procedure, there is limited data on the long-term outcomes of UTx for donors, recipients, and offspring (1). In the context of UTx, such data limitations relate to things like the safety of immunosuppressant drugs taken during pregnancy and lactation (13). For recipients of other solid organ transplants, particularly kidney transplants, immunosuppressants have been shown to represent distinct risks for the success of the pregnancy, fetal development, maternal health, and some childhood outcomes (52). Notably, some jurisdictions have legal protections for the future child's welfare – e.g., the UK's *Human Fertilisation and Embryology Act* (1990) requires assessments for the welfare of the future child – although the application of such protections in clinical scenarios is debated (29). Bioethicists argue that "therapeutic misconceptions" might exist as the research participant fails to fully appreciate the expected outcomes from clinical research, overestimating the benefits and underestimating the risks despite comprehensive counselling (53). However, proponents of UTx counter these concerns by highlighting the central importance of fully informed consent (1) and the benefits of expanding reproductive autonomy offered by this procedure (54). This same argument for greater reproductive autonomy is just as applicable to non-women who desire to carry pregnancies and deliver their offspring.

Given the narrow benefits and significant risks and costs of UTx, is it appropriate to categorically exclude non-women from pursuing similar desires to gestate and deliver their own children? Or, rather, is this exclusion perpetuating the same limited perspective on gender and reproduction that fuels the demand for UTx in the first place?

## SEX AND GENDER CRITERIA

I have detailed the ethical landscape – the costs, risks, benefits – defining UTx and the position of recipients, donors, and children within that landscape. To clarify, I am not arguing against the trials and potential acceptance of UTx as a therapeutic option. Rather, I am arguing that the socio-cultural perspective now used to justify UTx are neither ethically nor logically sound, and ought to be questioned and reconsidered, including (as this article focuses on) the gender requirements for recipients.

Even though UTx was first pioneered as a gender-affirming procedure for transgender women, the contemporary guidelines, narratives, and intentions of UTx research have, until recently, focused exclusively on genetic females as potential recipients. However, the merits of these exclusory criteria have since been challenged by scholars, practitioners, and would-be patients advocating for the inclusion of transgender women. Here, I critique some of the leading discussions and conclusions about sex and gender requirements for UTx eligibility.

In considering UTx for non-women, the foremost concerns that are distinct from those also faced by cisgender women include the specific technical obstacles of the procedure and the potentially unique adverse outcomes. There are several relevant anatomical and physiological differences between genetic males and females, including the availability of space within the abdomen to accommodate the graft and potential pregnancy; the availability of suitable vascularization, ligamentous support, and vaginal structure; and the variance in the hormonal environment of the recipient during pregnancy (3). However, an examination of these key differences by Jones et al. has concluded that "there is no overwhelming clinical argument against performing UTx as part of gender reassignment surgery" (3). There is thought to be sufficient homology in vascularization between genetic males and females, including the external iliac arteries used for the anastomoses in UTx. For those patients undertaking UTx as a gender-affirmation procedure, the hormonal environment is likely already feminized, although further modification may be needed, and a vaginal anastomosis will be possible from prior vaginoplasty.

There is also a legal argument for including transgender women as UTx recipients. Some non-discrimination legislation, such as the UK's *Equality Act* (2010), explicitly protects transgender people from both direct and indirect forms of discrimination to the extent that gender affirmation falls under legal provisions for protected characteristics (3). If UTx becomes an established treatment for women with AUFI, this statutory protection could prohibit discriminating against transgender women seeking UTx as a fertility treatment. A similar principle of non-discrimination could logically be extended to non-women seeking UTx as confirming a parenthood status as part of an innate, unchangeable identity. As with many cisgender people, parenthood is fundamental to many transgender individuals (55). How parenthood is legally recognized and defined has many important consequences, notably for children and especially in the context of ARTs (56).

### Montreal Criteria

The motivation for twenty-first-century experimental UTx trials was to provide therapeutic treatment for women with AUFI. This purpose was consolidated by the 2012 "Montreal Criteria" which outlined an ethical framework for patient eligibility to undergo the procedure. That framework's first provision reads: "The recipient is a genetic female of reproductive age with no medical

[12] Again, "modest" given the costs, risks and benefits of UTx as a non-life-saving intervention.

contraindications to transplantation" (2). The "Revised Criteria" explained that the original gender requirement derived from Francis D. Moore's criteria for surgical innovation (5), which indicates that the laboratory background must be congruent to the clinical application of the procedure (57). Of course, if the clinical applications are imagined more broadly and the laboratory background expands to include genetic males, then there is no basis for the gender requirement. Meeting Moore's criteria would require successfully performing UTx procedures on experimental animal models that are not genetically female (non-XX). Since publication, the Montreal Criteria has been frequently cited in UTx ethics literature (25). Researchers argue that Moore's criteria have been met for offering UTx to transgender women (4). If UTx is successful in transgender women recipients, much of the surgical precedent for offering UTx to non-women will be met. The genetic basis will also be met with transgender women recipients. Indeed, people with Swyer syndrome, who may have female reproductive organs but a typically 46, XY karyotype, have achieved successful pregnancies with medical interventions (58). Current requirements for UTx recipients include being a genetic female who can provide their own oocytes and/or embryos, can demonstrate child-rearing capacity, and is seeking treatment for appropriate reasons (29).

### Revised Criteria

Following a series of discussions, investigations, and publications suggesting that UTx is a viable option for transgender women recipients, Balayla et al. published a revised version of the Montreal Criteria. The Revised Criteria reversed the original stance that limited UTx eligibility to genetic females. Balayla et al. now argue that the time and research background is right for attempting UTx with transgender women recipients (5). Their justification for widening the criteria is twofold: offering treatment for gender dysphoria and responding to current social values (5). The former justification aims to enable transgender patients to attain so-called "body completeness"[13] and psychological benefits. The difficulty with such a goal is that UTx involves an ephemeral graft intended to be removed after successful and sufficient gestational use. The aim of therapeutic beneficence through body completeness is troubled by the risk of the recipient maintaining a harmful immunosuppressant regime and refusing to have a hysterectomy, as is their right once the graft is *in situ* (33). While UTx can be reimagined as a permanent QoL transplant to achieve body completeness, this is adding to risks and harms while potentially diminishing the importance of gestation in the justification of UTx.

To explain their latter justification about current social values, Balayla et al. argue that "it is not the business of medicine to decide what is unreasonable to request for a person of sound mind, except as it relates to medical and surgical risk, as well as to distribution of resources" (5). In other words, if a person of sound mind requests an operation, then who is the medical practitioner to refuse unless that request poses an undue risk or excessive medical resource consumption? This reasoning allows for any person with a risk and cost profile similar to a genetic or transgender woman to request and receive a UTx procedure. In other words, Balayla et al.'s justification should allow for non-women to be deemed as eligible UTx recipients.

Throughout their analysis, Balayla et al. also rely on biological reductionist arguments that affirm the notion that womanhood is dependent on a functional and productive uterus. Such arguments are antithetical to numerous rights-based perspectives, including those commonly advanced by critical disability and critical feminist theorists. Indeed, Balayla et al. suggest that "[i]t is normative for a person who wishes to reproduce to do so, either as part of a couple or, technological circumstances permitting, as an individual" (5). This assumption about the realization of desires to reproduce as a normative experience uncritically promotes surgical intervention towards "body completeness." The authors continue this pronatalist reasoning to absurd conclusions: "It then follows that it is normative for a person with a uterus of reproductive age who wishes to become pregnant to do so" (5). This notion, that fertile people who desire to reproduce will, is divorced from the reality that many such people do not reproduce for innumerable reasons, including conflicting desires, improper circumstances, and beliefs to the contrary. In short, not everybody who wants to become pregnant becomes pregnant, and for myriad reasons. Further, the principle of reproductive autonomy includes the idea that a person can choose their reproductive behaviours, even if non-normative. Clearly, experimental medical programs, such as UTx trials, do not passively reflect social norms. Such forays into new medical treatments actively change the landscape of how people imagine and embody reproduction, sex, and gender. Therefore, those involved in experimental programs should carefully ground their work in sound ethical principles. If redressing discriminatory guidelines is a principled goal, then it behoves policy makers to remove all possible discriminatory guidelines, not just those that are of moment.

In the end, a critical question left unasked by the Revised Criteria is: *can womanhood be achieved by possessing a functional uterus?* The Revised Criteria effectively reiterates gender binaries through new exclusionary criteria and broader medical interventions based on normative reasoning that still does not accord with core principles in reproductive and sexual medicine such as empowerment and autonomy.

## QUEERING UTX

To this point, I have attempted to show that – given the ethically fraught nature of UTx – the exclusion of non-women as recipients is largely unjustified and incongruous with deeply held healthcare ethical principles such as egalitarianism and equal access. According to the very arguments made by those advancing the inclusion of transgender women, UTx should also be made available to non-women who desire gestating their offspring and who meet all other non-gender requirements for recipients. In basic egalitarian terms, if the costs, risks, and benefits are not significantly different, access to a medical treatment

[13] "Body completeness" is not an established medical or scientific concept but is used by Balayla et al. to justify UTx for transgender women on QoL terms.

should not significantly differ between groups. One may argue that the outcome of gender identity affirmation is missing for non-women. However, while gender identity affirmation is often noted as a benefit of UTx, it is not a required goal for cisgender women recipients, nor is body completeness an unproblematic goal for transgender women recipients, who will be advised that the graft should ultimately be removed to ameliorate risks associated with immunosuppression. The remaining arguments against including non-women are 1) technical issues with anatomy and physiology and 2) that such procedures would be non-normative.

## Technical Issues

Many of the anatomical and physiological issues presented by non-women recipients are shared with transgender women recipients. However, as concluded for transgender women recipients, there are no foreseeable clinical issues representing insurmountable obstacles (3,59). Two key differences between non-women recipients and transgender woman recipients are the hormonal environment and the neovagina. Towards the first difference, Balayla et al. argue that an orchiectomy is needed to ensure the success of the UTx operation and to carry a pregnancy (5). This requirement supposedly excludes non-women (5), although many have testicular failure (60). For those with functional testicles, an appropriate hormonal environment could theoretically be achieved by antiandrogens and feminizing hormone therapy similar to the treatments undertaken by many transgender women (61,62). This possibility of inducing a hormonal milieu for a functioning uterus while maintaining testicles requires experimental proof.

The major anatomical difference for non-women is the absence of a vaginal structure. For UTx, the vaginal structure functions as an important attachment for fixing the graft in place, an outflow for menstrual blood, and access for embryo transfer (31). Also, a recent study highlighted the role of the vaginal microbiome in protecting the uterine graft from harmful infections (63). However, many cisgender women with MRKH have varying degrees of vaginal shortening and receive surgical treatments (63). A study of UTx recipients who had such surgical procedures revealed a wide range of vaginoplasty, including skin and sigmoid neovaginas, and an acellular porcine small intestine submucosa graft (63). For transgender women recipients, a neovagina is a likely prerequisite for UTx. Some transgender women have sigmoidal neovaginas that host microbiota more consistent with that found in the bowel (63). The data on sigmoidal neovaginas in UTx is limited to a single instance, which resulted in multiple miscarriages and no live births, although the uterine graft was successfully maintained for several years (63). Data from women who had vaginoplasty because of cervico-vaginal atresia confirmed higher rates of infections and worse reproductive outcomes. However, successful deliveries have been reported for women with skin neovaginas, amniotic membrane neovaginas, and, in a single instance, an intestinal neovagina (63). Successful UTx trials with transgender women will be a key indicator of the possibility of UTx for non-women recipients. Potential alternatives to sexually functioning neovaginas will need to be explored for non-women who seek UTx. Potentially, the transplanted uterus could have the cervix exposed in the lower abdomen, making a vaginal canal unnecessary. A modified vaginoplasty for non-women might not be as radical a procedure as it sounds. It might also be asked, if a genetic male has a neovagina, feminizing hormone therapy, and a UTx, are they a transgender woman? I think the answer is – not necessarily.[14] The answer to this question is also largely irrelevant to a clinician's analysis of a potential UTx recipient, given the procedure's subjective QoL benefits and its significantly high costs and risks.

## Reproductive Norms

Medicine is often instrumental in facilitating social changes relating to sexuality and reproduction. Take, for instance, the provision of new oral contraception in an era of relative sexual liberalism (66) or the gradual acceptance of artificial insemination that paralleled a dissociation between male virility and manhood (67). But how intentional should professional medicine be in actively facilitating such changes? In setting out the eligibility requirements for UTx recipients, the authors of the Revised Criteria suggest that researchers and clinicians should merely reflect social norms. While a passive approach might seem less ethically fraught, it is a fallacy. Not only is scientifically measuring sexual norms and reproductive desires a notoriously difficult undertaking, but the role of medicine is often as a catalyst, or at least a gatekeeper, for social changes in sexuality and reproduction. Even clinical studies of sexual and reproductive issues will inevitably influence the participants' perceptions of those very issues. Medical researchers and clinicians hold positions of responsibility and influence for such socio-cultural changes. The very nature of gender affirmation and, consequently, the manifestation of gendered identities, is fixed to medical discussions, perspectives, policies, and procedures. Therefore, those involved with UTx research need to reflect seriously on how they propagate and reinforce certain cultural perspectives and social norms about sex, gender, and reproduction.

UTx might exacerbate the harms of infertility and anatomical difference. As O'Donovan et al. observe, UTx operates much like other ARTs in propagating the "motherhood mandate" in which a growing medical industry facilitates women achieving motherhood as part of a gender-fulfilling expectation (29). For example, some specialist physicians suggest that UTx "offers women anatomically or functionally unable to bear children the possibility of becoming mothers and giving birth to healthy infants" (16). This description reiterates the notion that motherhood follows from uterine functionality and gestation. While the experience of motherhood through UTx or any other ART is not intrinsically diminished because of medical intervention, such descriptions do promote surgically intensive procedures as relatively unproblematic routes to attaining "natural" experiences

[14] A recent study of transmasculine individuals who became pregnant found that some experienced pregnancy as congruent with their masculine gender identity (64). For the institutional barriers faced by pregnant, delivering, and parenting trans men, see (65).

of motherhood. This kind of maternal ideal underlies the demand for UTx and boosts the perceived[15] QoL benefits to offset the substantial costs and risks.

UTx may also diminish the desirability and availability of alternate parenthood options with more societal benefits, like adoption and surrogacy when performed under ethically sound regulatory frameworks (29). Indeed, UTx aligns with other ARTs, including IVF and gestational surrogacy, by advancing pronatalism and a specific form of geneticism that prioritizes close biological ties over other kinds of familial connection (29). Ethical justifications for UTx depend upon geneticist perspectives (68). Pronatalism and geneticism are less altruistic and utilitarian in principle, especially when costly ARTs are involved. For instance, the Middle East, where some of the earliest attempts at UTx happened, is described as a region that is "decisively pronatalistic" (69). In such cultural contexts, opting for a UTx procedure has been criticized as "more of a social decision than a medical one" (69). As an elective QoL procedure, UTx can also be understood as part of a growing socio-medical trend in body modification (70). These parameters again raise questions about the value of gestational experience and genetic similarity versus the potential harms caused by medical interventions, and they promote potentially deleterious views like pronatalism and geneticism.

For some transgender women, UTx may offer a route to address body dysphoria (3). However, even this benefit has a questionable justification. As Balayla et al. explain, "[t]he clinical scenario whereby a transgender woman seeks to undergo a UTx would be consistent with the natural premise that women carry pregnancies, and that such individuals identify as females" (5). This justification from a "natural premise" effectively enshrines a narrow and denigratory view that women are defined by carrying pregnancies. While transgender patients are entitled to pursue this motivation of embodiment and self-fulfillment (71), researchers and clinicians must exercise caution and reflection about how UTx is framed as a medical intervention. UTx should not be advertised as "womanhood for sale." Historical and social studies have shown just how mutable gender identities are as a construct in medicine at different times and places (72,73). UTx is justified as a treatment for the harms of infertility, parenthood desires, and body dysphoria; yet, as critics emphasize, UTx reinforces a restrictive narrative that binds womanhood to gestation, pregnancy, and genetically related children (29). While other ARTs can also reinforce problematic gender norms, which similarly deserves of scrutiny and criticism, UTx differs in the reasoning commonly used by those seeking treatment, the fact that it is an invasive surgical intervention, and in the kinds of associated costs and risks. Donovan et al. observe that "a society in which biological ties are less valorized may be beneficial and ameliorate some of the harms caused by infertility" (29). If so, does UTx represent a productive and beneficial response to gender identity issues related to perceptions of womanhood or does it actually create harms and propagate disparities?

Offering UTx to non-women might ease the restrictive association between womanhood and gestation, uterine function, and pregnancy. By complicating the association between womanhood and gestation, non-women who undergo UTx might alleviate some of the psychological burden placed on infertile women by social expectations about reproduction. Opening UTx to non-women also represents a potential infertility treatment for single men or in couples where a male partner is the only possible candidate to carry the pregnancy, including homosexual male couples and heterosexual couples in which the female partner is unable or unwilling to carry the pregnancy. In light of the complexities, risks, and costs of providing UTx to cisgender women and transgender women, it seems needlessly discriminatory to categorically exclude non-women as potential recipients.

## IMPLICATIONS FOR DONATION SCHEMES

Like any transplantation scheme, donors are fundamentally important to UTx. As a novel QoL procedure, UTx might negatively affect the willingness of would-be donors. However, like other QoL transplants, such as face or limb, UTx would be excluded from general deceased donation schemes and require explicit consent from the next-of-kin (1,33). It has been demonstrated that next-of-kin are less likely to consent to donate if the specific organ was not previously considered (33). UTx for transgender women or non-women recipients might compound this reluctance on the part of donors. Depending on the demand for UTx, these hurdles might not be significant, especially as UTx is not as time sensitive as critical transplantations or those relying more on deceased donors. One report on UTx donation indicates that about 75% of procedures have used live donors, 70% of whom are close to the recipient (29). If this trend of direct donation from live donors continues, it will mitigate potential problems with deceased donor schemes. As with other donations, UTx requires fully informed consent, even more so because of the procedure's novelty and uncertain ethical grounding (37). Non-direct donations will raise allocation issues, which some researchers argue should be resolved according to principles of equity, reproductive opportunity, and the likelihood of success (29). These same principles could be readily extended to transgender women and non-women recipients. Indeed, the introduction of non-women as recipients might offset some hypothesized objections to public funding for UTx, including those critical of the current rhetoric surrounding UTx as wrongly associating "the ability to experience gestation and womanhood or femininity" (74). Eventually, these donor issues will become less consequential as UTx researchers are already pursuing bioengineered uterine grafts (75).

## ADDED RISKS FOR DONORS, RECIPIENTS, AND CHILDREN

A final consideration for removing the gender requirement for UTx is whether having non-women recipients represents added risks for donors, recipients, and children. Safety is known to be a crucial factor for public support of UTx (44). For donors, there are likely no added risks or harms, given that the operation would be the same as for transgender women recipients. UTx trials

[15] My use of "perceived" is to highlight this subjective goal shared or advanced by certain groups of patients and practitioners.

have already been justified on the basis that the harms, risks, and consent issues for donors are comparable to those in existing organ donation and research programs (34). The same justification would apply to trials involving non-women recipients. However, extra care and safeguards should be used in obtaining fully informed donor consent, given the added novelty of the procedure.

Non-women recipients would require special clinical considerations, although these would be comparable to those needed for transgender women recipients. As discussed above, hormone therapy would be necessary as would creating a structure analogous to a neovagina. Physical health risks would include post-operative complications, including infections, thrombosis, uretic injuries, and consequences of immunosuppression. Psychological risks would relate to gender identity, sexual dysfunction, and trauma related to undergoing transplant surgery (26), all of which are broadly shared with genetic and transgender women UTx recipients.

Legal uncertainties will also arise with expanding UTx to transgender women and non-women, as some legal definitions of a child's mother are determined as the person who gestates and births (33). Some aspects of biological and legal parenthood following UTx are unknown, such as whether offspring contain genetic traces of the uterus donor and how that could affect legal parenthood (30). To be fair, many legal issues about parenthood are connected to embryo creation, rather than UTx specifically. With expert advice, lawmakers can resolve many issues with these legal definitions by enacting common-sense amendments that properly recognize parental intentions, consent, and responsibilities. In most if not all jurisdictions, better-crafted legal frameworks surrounding these continued innovations in ARTs are needed to provide certainty and clarity for children, parents, donors, and recipients.

## CONCLUDING RECOMMENDATIONS

UTx trials are ethically fraught, yet they have been deemed justifiable based on the promise of clinical application, therapeutic value, and reproductive autonomy. It seems likely that UTx will soon be offered to transgender women. Given the substantial ethical problems with UTx and the likely inclusion of transgender women, the perpetuation of gender criteria is more socially harmful and needlessly discriminatory than clinically useful or ethically sound. Not only will including non-women as eligible recipients extend the same reproductive autonomy as that being granted to genetic and transgender women through this procedure, but including such recipients promises to counteract some of the potentially harmful gender constraints and reproductive norms reinforced by ARTs.

To further explore the possibility of expanding UTx eligibility to non-women or, rather, any sex and gender, researchers will need to survey potential interested patients, test the procedure on animal models, and review all data on long-term risks and harms from past and current UTx trials. A publicly available registry for UTx procedures with appropriate privacy protections would permit better data sharing and the optimization of safety and efficiency (29). Even a very small proportion of non-women interested in UTx could represent a significant number of potential recipients.

Removing the UTx gender criteria offers important social benefit. UTx is intended to improve quality of life, and that quality is largely determined by psychosocial factors and socio-cultural determinants relating to pregnancy and identity. Including non-women as possible UTx recipients will not diminish the positive meanings of gestation; rather, such an inclusion would demonstrate that uterine function is not part and parcel of womanhood.

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