

Review

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Sexual health outcomes of non-facial gender-affirming surgery: a narrative review

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Abstract

For many individuals, sexual health is an important part of overall health and well-being, yet it remains an overlooked aspect of care for transgender and gender diverse (TGD) patients. While cisgender and TGD individuals share many sexual health needs, TGD patients face unique clinical considerations that physicians - particularly surgeons - must understand in the context of gender-affirming surgery (GAS). As demand for GAS grows, it is essential that plastic surgeons and other surgical specialists recognize how these procedures affect sexual health, sexual function, and satisfaction. This review summarizes current evidence on sexual health outcomes in TGD populations following commonly performed GASs, including chest masculinization, breast augmentation, phalloplasty, metoidioplasty, vaginoplasty, and vulvoplasty. These procedures can substantially enhance quality of life (QOL) by improving body congruence and sexual well-being; however, they may also introduce anatomical, neurological, or psychosocial challenges that influence sexual health. To ensure that patients can provide fully informed consent, surgeons must understand these outcomes and communicate them effectively as part of surgical planning and throughout both pre- and postoperative care.

Keywords: Gender-affirming surgery, transgender health, sexual health, phalloplasty, vaginoplasty, metoidioplasty, breast augmentation, masculinizing chest surgery



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INTRODUCTION

Sexual health is a vital component of overall health and well-being, encompassing physical and psychosocial health, freedom from violence and coercion, and access to competent healthcare^[1]. Although transgender and gender diverse (TGD) individuals share many of the same sexual health needs as the general population, they also face unique clinical considerations - particularly in the context of gender-affirming care (GAC)^[2-4].

Broadly, GAC includes hormone therapy, mental health care, social and legal support, primary care, voice therapy, sexual health counseling, and surgical interventions^[4]. Although all aspects of GAC contribute to overall well-being, gender-affirming surgeries (GASs) play a particularly significant role for many TGD individuals. For those who pursue them, GAS can help achieve embodiment goals, alleviate gender dysphoria, improve psychosocial and mental health outcomes, and enhance QOL^[3-7].

Accurately estimating the size of the global transgender population remains difficult due to gaps in data collection and variations in sociolegal contexts. Nevertheless, available evidence suggests that prevalence ranges from a fraction of a percent to several percentage points^[4]. In the United States, recent epidemiological data suggest that the transgender population is increasing, especially among younger age groups - a trend attributed to greater social acceptance and improved survey methods^[8]. Current estimates suggest that more than one million transgender individuals live in the U.S.

Data from the 2022 United States Transgender Survey (USTS) show that 56% of transgender individuals had received hormone therapy (although 88% expressed a desire for it), and 29% had at least one GAS (with 84% expressing interest in at least one surgery; see [Table 1](#) for a breakdown by procedure)^[9]. Similarly, findings from the 2019 Fundamental Rights Agency (FRA) Survey in the European Union indicated that 48% of transgender respondents in the Netherlands, 46% in Germany, 36% in Sweden, and 33% in Denmark had undergone GAS, compared with an EU average of 27% (see FRA 2023 for full data)^[10]. Although surgical data from low- and middle-income countries remain limited, available evidence highlights a consistent and growing global demand for gender-affirming surgical care^[11].

Common GASs include masculinizing chest surgery, feminizing breast augmentation, phalloplasty, metoidioplasty, vaginoplasty, and vulvoplasty. While these surgeries can enhance body congruence and relieve gender dysphoria - often with positive effects on sexual functioning - they may also pose anatomical, neurological, and psychosocial challenges. These considerations underscore the need for careful management and realistic preoperative counseling. This review synthesizes the current literature on both positive and negative sexual health outcomes following GAS, identifies gaps in knowledge, and highlights areas for future research aimed at optimizing care for TGD individuals. For the purposes of this paper, sexual health outcomes are defined as outcomes directly affecting the sexual experiences of TGD individuals, including changes in gender dysphoria, factors influencing sexual self-esteem and comfort with intimacy, changes in sensation, and functional changes that affect sexual activity (e.g., the ability to engage in penetrative sex in new ways).

METHODS

This was a narrative review constructed around an outline developed by the two authors, drawing on the senior author's expertise as a certified sexuality educator and social worker working with patients seeking GAS, as well as her years of experience providing clinical education on TGD sexuality. The literature on each topic was reviewed by both authors using PubMed (primary source) and Google Scholar (secondary source) to identify relevant publications. Where systematic reviews were available, they were considered alongside the primary literature.

Table 1. Overview of common gender-affirming surgical procedures

	Name	Description	% Had	% Wanted	% Unsure
Feminizing procedures	Breast augmentation/ "top surgery"	Similar to breast augmentation in cisgender women but with unique anatomical considerations ^[59,60] . Usually not pursued/recommended until breast development from hormone therapy has stabilized	8	36	36
	Vaginoplasty/ "bottom surgery"	Involves penectomy, urethral shortening, orchiectomy, creation of a clitoris using the neurovascular bundle of the glans, formation of the vaginal vestibule and urethral opening, and construction of the labia. The vaginal canal is most often lined with penile-scrotal skin; other techniques use peritoneal or colon flaps. Requires lifelong dilation and douching, which may be difficult for some patients	9	42	27
	Vulvoplasty/ "bottom surgery"	Similar to vaginoplasty but without creation of a vaginal canal; also termed "zero-depth vaginoplasty". The absence of dilation/douching requirements makes this option preferable for some women. It may also be chosen for other personal reasons			
	Orchiectomy	Removal of the testes; may be performed alone for hormonal control or as part of vaginoplasty, depending on patient goals	11	42	25
	Facial feminization surgery/"FFS"	A set of procedures designed to alter the facial and cranial appearance to a more feminine presentation. May include jaw contouring/reduction, brow and eyelid lifting, forehead and hairline contouring, rhinoplasty, and other procedures. Shown to significantly improve observer accuracy in gender perception ^[61]	5	41	33
	Tracheal shave	Removal of a portion of the thyroid cartilage (the "Adam's apple") that develops during testosterone-dependent puberty. Also known as thyroid chondrolaryngoplasty. May be performed alongside vocal cord surgery to raise the vocal pitch	3	28	36
Masculinizing procedures	Masculinizing chest surgery/ "top surgery"	Removal of most glandular breast tissue with modification of the nipple-areola complex, and sometimes chest contouring, to create a more masculine appearance. Some non-binary individuals may prefer breast reduction rather than a full mastectomy. Patients may choose to forgo nipple grafts. Some may later have nipples tattooed	20	57	15
	Hysterectomy	Typically includes bilateral salpingectomy to reduce cancer risk, may be performed with or without oophorectomy, depending on patient preference. Prerequisite for any genital surgery involving vaginectomy	6	51	28
	Metoidioplasty and phalloplasty/ "bottom surgery"	Can be performed with or without urethral lengthening, depending on the desire for standing urination. Urethral lengthening usually requires concurrent vaginectomy. Metoidioplasty uses the hormonally enlarged clitoris as the neophallus (similar to a micropenis). Phalloplasty uses a local or distant flap (various techniques) placed over the anteriorly repositioned clitoris to create a larger neophallus, potentially more suitable for penetration. Erectile implants are required for penetrative function and often require replacement; however, some patients pursue alternative methods for achieving sufficient rigidity ^[62]	1/1 [†]	13/11	42/31

^{*}includes both vaginoplasty and vulvoplasty; [†]metoidioplasty/phalloplasty; ^{**}sexual function outcomes of FFS are not included in this review due to limited research^[18]. Population interest data are from the 2022 United States National Transgender Discrimination Survey, which included responses from 92,329 transgender individuals aged 16 years and older^[9]. FFS: Facial feminization surgery.

SEXUALITY IN TGD PATIENTS

Sexual orientation, sexual attraction, and sexual behavior are distinct constructs and should not be assumed to determine one another, nor should they be presumed on the basis of gender modality - that is, whether a person identifies as cisgender or transgender.

Transgender individuals in the United States report a wide range of sexual orientations, though they are generally less likely to identify as heterosexual than the general population^[12-15]. In the 2015 USTS, 21% of respondents identified as queer, 18% as pansexual, 16% as gay/lesbian/same-gender-loving, 15% as straight, 14% as bisexual, and 10% as asexual^[16]. Similar distributions were observed in the EU according to the 2019 FRA survey data^[17]. Clinicians should also recognize that sexual orientation, attraction, and behavior are not static; they may change over time, including during social, medical, and surgical affirmation^[15,18,19]. Sexual histories, when relevant to care, should therefore be reassessed regularly through respectful inquiries about orientation and behavior.

When discussing sexual orientation in the context of surgical assessments, it is critical not to conflate orientation with behavior. Where GAS may affect specific aspects of sexual function (e.g., nipple stimulation, ability to receive or engage in genital penetration), clinicians should ask about patients' interest in and/or experience with particular behaviors to provide appropriate counseling on possible sexual effects and risks^[20].

SEXUAL HEALTH AND FUNCTION IN TGD INDIVIDUALS

The World Health Organization defines sexual health as including “the possibility of having pleasurable and safe sexual experiences”^[21]. This definition extends beyond reproductive rights and the treatment of dysfunction to envision a world where individuals can express their sexuality positively. Achieving sexual health, in this framework, is more comparable to achieving gender euphoria than merely treating gender dysphoria - a positive and affirming goal rather than simply addressing dysfunction^[22].

For some individuals, gender-affirming hormones and surgery improve sexual health by alleviating gender dysphoria and allowing them to inhabit a body that feels comfortable and sexually affirming. This may involve both the removal of body parts that are incongruent with self-image and distressing for sexual interaction (e.g., chest masculinization surgery) and the creation of body parts aligned with one's sexual self-image (e.g., vaginoplasty). Recognizing that gender affirmation can foster greater sexual self-confidence also highlights a fundamental problem with the concept of autogynephilia: it is normal for individuals to have sexual fantasies involving the body in which they feel most comfortable living^[23-25].

As with cisgender individuals, TGD individuals display diverse sexual orientations and desires, along with differences in sexual health that may reflect functional concerns as well as experiences of dysphoria and minority stress^[26-28]. A large European study reported that the most common sexual dysfunctions among trans women were difficulties initiating sexual activity and achieving orgasm, although overall sexual function generally improved after genital surgery^[29]. A review of the literature similarly found that sexual health improved after vaginoplasty, though interpretation is complicated by the lack of standardized outcome measures and the limited number of studies prospectively assessing sexual health prior to surgery^[30]. Prospective research is particularly important for determining how presurgical sexual function influences postsurgical outcomes.

Available data suggest that transgender individuals may experience higher rates of sexual dysfunction than the general population prior to genital surgery, and that surgical interventions often improve - but do not fully eliminate- these differences. A 2021 systematic review reported that among transmasculine individuals, hormone therapy generally improved desire and arousal, while surgery had mixed effects on these domains but typically enhanced sexual activity and satisfaction. For transfeminine individuals, hormones showed mixed effects on desire, but surgery consistently increased both arousal and desire^[31]. Interpretation remains challenging due to heterogeneity in study designs and outcome measures, as well as variability in

dysfunction estimates in both TGD and general populations^[32,33].

It is also important to recognize that TGD populations may have higher rates of certain chronic diseases (e.g., diabetes, obesity) and behavioral risk factors (e.g., trauma, smoking) that can affect sexual health and function^[34-36]. A multidisciplinary approach is therefore valuable during the perioperative process, involving collaboration between surgeons, social workers, behavioral health professionals, and patients' primary care, mental health, and specialty providers^[4,37-39].

EFFECTS OF GENDER-AFFIRMING HORMONAL THERAPY ON SEXUAL FUNCTION

Most individuals who undergo GAS first receive gender-affirming hormone therapy (GAHT). GAHT is often, though not always, a prerequisite for surgery. Its positive effects are well documented, including improved quality of life (QOL) and reduced depression, anxiety, and suicide risk, and are supported by a growing body of literature and consensus guidelines^[3,4,40-46]. Hormone therapy can also influence sexual health and future surgical planning.

Masculinizing hormone therapy typically involves the use of exogenous testosterone in various formulations. Sexual effects - many of which are desirable for some or all patients - include amenorrhea, vaginal atrophy, clitoral enlargement, and increased spontaneous arousal^[3,4,47-49]. Vaginal atrophy and clitoral enlargement may become apparent soon after initiation, with peak effects observed after 1-2 years of therapy^[49]. Large-scale survey studies also report an association between testosterone use and pelvic pain, particularly with sexual penetration, likely secondary to atrophic changes^[50]. For patients with persistent or distressing symptoms related to vaginal atrophy, topical estrogen and/or vaginal moisturizers can be used without significant systemic absorption^[51].

Feminizing hormone therapy involves the use of estrogens, often combined with an antiandrogen such as spironolactone or cyproterone acetate (the latter not commonly prescribed in the United States). Some individuals may also receive, or request, adjunctive progesterone. Common sexual effects of estrogen include reduced spontaneous arousal, decreased erectile function, lower semen volume, and testicular atrophy^[3,4,49,52]. Patients should be counseled about these potential effects. While some may find them desirable, others may experience them as distressing; in such cases, adjuvant medications or dose adjustments may help^[4]. Antiandrogens generally carry sexual effects similar to those of estrogen.

Earlier guidelines recommended perioperative cessation of GAHT for both testosterone and estrogen. However, more recent studies have found no increased risk of venous thromboembolism (VTE) or other surgical complications when hormones are continued^[53-56]. Moreover, perioperative cessation carries risks of mood disturbance related to hypogonadism. Accordingly, current international guidelines advise against stopping hormones in the perioperative setting^[4]. Nevertheless, consensus is lacking, and existing standards of care do not provide a specific recommendation on perioperative hormone use^[4]. Surgeons should therefore employ shared decision making with each patient to determine the most appropriate approach.

Gonadotrophin release hormone agonists (GnRHAs, or puberty blockers) are prescribed to TGD children at Tanner Stage II to pause the development of secondary sex characteristics, allowing more time for identity exploration and planning for future interventions (e.g., hormone therapy)^[3,4]. Importantly, recent studies indicate no evidence of negative impacts of pubertal suppression on long-term sexual health, function, or well-being, while highlighting multiple positive outcomes in these domains^[57,58]. It is highly unlikely that a patient would still be on GnRHa therapy at the time of surgery, except potentially as an adjuvant to estrogen therapy as an alternative to other antiandrogens.

SEXUAL HEALTH IMPACTS OF COMMON TYPES OF GAS

Many commonly performed GASs can affect sexual health, both positively and negatively. These include masculinizing chest surgery, feminizing breast augmentation, vaginoplasty, vulvoplasty, phalloplasty, and metoidioplasty (see [Table 1](#) for an overview)^[59-62]. Other procedures, such as facial feminization or masculinization surgery, may also enhance sexual well-being indirectly through improvements in body image and sexual self-esteem. This review, however, focuses on surgeries with more direct effects on sexual anatomy and function.

Masculinizing chest surgery

There are numerous surgical techniques for masculinizing chest surgery, including double incision with free nipple graft (the most common technique), inferior pedicled mammaplasty, semicircular, transareolar, concentric circular, and extended concentric circular approaches. A full description of each technique is beyond the scope of this review^[63]. The selection of technique depends on surgeon training, patient preferences, and breast characteristics^[64]. When patients are appropriately selected, there is no strong evidence suggesting significant differences in sexual health outcomes or subjective satisfaction between techniques, provided surgical complications do not occur^[65]. Complications vary by technique but are generally uncommon, including hematoma, seroma, and, more rarely, nipple necrosis or abscess formation^[66].

A critical factor influencing both healing and sexual function is the management of the nipple-areolar complex (NAC). Surgeons may leave the NAC largely in place, remove it completely, or modify and reposition it to enhance the masculinized appearance. These decisions are guided by both surgical technique and patient preference. Some individuals may choose to forgo nipples altogether due to concerns about graft healing or aesthetic considerations. Others may prioritize nipple preservation due to its role in sex stimulation and may require more intensive counseling regarding potential surgical effects. Importantly, most individuals undergoing chest masculinization report extreme discomfort with others seeing or touching their unaltered chest^[67]. Thus, the key consideration may not be whether patients can retain nipple sensation but whether they can engage in sexual activity involving their chest.

Data on NAC sensory preservation are variable. Small-scale studies report rates of NAC sensation loss ranging from 19.7% to 53.3% in theoretically nipple-sparing procedures (inferior pedicled mammaplasty, semicircular, transareolar, and concentric circular) and from 56.6% to 100% in nipple-grafting procedures (double incision and extended concentric circular)^[68-70]. This variability underscores the importance of counseling patients about the risk of sensation loss, which has been linked to reduced sexual arousal and self-esteem in some cases^[71].

Despite these differences in sensation outcomes, masculinizing chest surgery generally has strong positive effects on sexual health and overall well-being. An international systematic review ($n = 1,052$) by Bustos *et al.* reported a pooled patient satisfaction rate of 92%, with improvements in QOL, reduced gender dysphoria and depression, and increased sexual confidence^[65]. Although many studies included in the review had mean follow-up times of less than one year, some included follow-up periods of up to six years, all demonstrating sustained improvements in these outcomes. Additional studies have reported extremely low regret rates and significant gains in QOL, sexual satisfaction, and psychosocial functioning^[6,7,18].

Feminizing breast augmentation

While some transfeminine patients may achieve satisfactory breast development through hormonal therapy alone, many opt for surgical breast augmentation to meet their embodiment goals. Studies estimate that up

to 75% of transfeminine patients pursue this option^[3,4,9,49,59]. The most common surgical method for breast augmentation in this population involves the use of breast implants. However, there is no standardized or validated approach for selecting implants or determining the placement plane in transfeminine patients. Surgeons generally rely on adapted techniques and tools designed for cisgender patients^[59].

The complication rates for breast augmentation in transfeminine patients are low and comparable to those seen in cisgender populations. These complications include symmastia, capsular contracture, altered nipple sensation, implant leakage and migration, hematoma/seroma, and infection^[66,72]. Because there is less manipulation of the NAC compared to masculinizing chest surgery, the risk of sensory loss is significantly lower. However, patients should still be counseled about this potential risk and its possible impact on sexual health. Other sensory changes to the chest may also occur after augmentation^[59].

As with masculinizing chest surgery, there is substantial evidence showing improved QOL, psychosocial functioning, and sexual health following feminizing breast augmentation. One study, for example, reported more than double the scores for sexual well-being on the BREAST-Q survey after the procedure^[6,7,18,73,74].

Vaginoplasty/vulvoplasty

Feminizing genital surgeries, including vaginoplasty and vulvoplasty (collectively referred to as vulvovaginoplasty), have been studied extensively, particularly in the context of sexual health. Unlike other forms of GAS, these procedures typically involve a combination of penectomy, reshaping and relocating the glans to create a sensate clitoris, aesthetic vulva creation, and vaginal formation. However, some individuals seeking feminizing genitoplasty are not interested in vaginal penetration and may choose techniques that do not include the creation of a vagina. These options also avoid the lifelong need for vaginal dilation that follows vaginal vault construction.

Several surgical techniques fall under the umbrella of vaginoplasty. The most commonly reported technique is penile inversion vaginoplasty, which uses penile, scrotal, and perineal skin to line the cavity of the neovagina^[4,30,75,76]. Other methods involve tissue from donor sites, such as bowel or peritoneal flaps, which can offer additional benefits, including natural lubrication and varied tissue texture^[4,77]. Selection of the technique depends on multiple factors, including the surgeon's expertise and the patient's anatomy and embodiment goals, much like gender-affirming chest surgery.

The sexual health benefits of gender-affirming vaginoplasty are well documented. Numerous studies have shown significant improvements in sexual function and satisfaction. These improvements are correlated with factors such as vaginal depth and width, pain levels, ease of orgasm, absence of surgical complications, clitoral sensation, vulvar appearance (especially the ability to "pass" as a cisgender female), and natural lubrication when flaps other than penile skin are used to line the vaginal canal^[30,77-79]. Notably, reviews emphasize that "objective" measures of genital sensation (e.g., devices using electrical current or vibration to assess sensitivity thresholds) have no correlation with patients' self-reported experiences of orgasm, pain, erogenous or tactile sensation, or overall sexual satisfaction.

Achieving orgasm post-vaginoplasty varies across studies, but reviews consistently report that ~80% of patients achieve satisfactory frequency and intensity of orgasm^[30,77-79]. This rate is comparable to that of cisgender women, though data are limited^[80,81]. Rates of dyspareunia (pain during intercourse) vary between 25%-75%, and this should be addressed during patient counseling. Importantly, transgender women post-vaginoplasty report similar scores on the Female Genital Self-Image Scale (FGSIS) as cisgender women, indicating high levels of body congruence, self-confidence, and sexual satisfaction with genital appearance^[79].

A critical area of counseling for potential vaginoplasty patients is the lifelong requirement for dilation if they are not engaging in regular vaginal penetration, as well as douching. Many patients find these activities unpleasant, and for some, this may lead to choosing vulvoplasty instead (sometimes called “zero-depth” vaginoplasty)^[77]. Based on clinical experience, the senior author notes that survivors of sexual trauma may face particular difficulties with dilation. Providers should assess whether patients who experience extreme aversion to handling their genitals may struggle with postoperative dilation and hygiene. If concerns arise, patients should engage in presurgical counseling with a knowledgeable therapist to help them manage postoperative care. “Failure to dilate” and “non-adherence to dilation” are frequently cited as key drivers of complications, highlighting the complexity of the procedure and the need for closer collaboration with patients^[76,77]. In addition to psychological therapy, pelvic floor physical therapy (PT) referrals may help address both physical and emotional concerns before and after surgery (see The Role of Adjunctive Therapy in Sexual Health After GAS below).

Regarding vulvoplasty, patient satisfaction, including overall QOL and sexual function, is generally high. In one cross-sectional study, a 93% satisfaction rate was reported^[77,82]. Over half of the patients who chose vulvoplasty did so without any medical contraindications, highlighting that there are multiple reasons people opt for this procedure. Vulvoplasty is not an inferior procedure to vaginoplasty, nor is it only for those for whom vaginoplasty is medically contraindicated. It is simply a different option.

Phalloplasty/metoidioplasty

The goal of both phalloplasty and metoidioplasty is to create a more masculine genital appearance and function, often including the ability to urinate while standing. For some individuals, this functional aspect is a higher priority than sexual function^[83]. Metoidioplasty utilizes the hormonally enlarged clitoris as the body of the phallus, resulting in what is functionally a micropenis. In contrast, phalloplasty creates a larger phallus using a local or distant tissue flap. Both procedures typically involve creating a scrotum, and may also include urethral lengthening and/or vaginectomy (removal of the vagina). Individuals wishing to use their phallus for sexual penetration are generally advised that phalloplasty is the more appropriate procedure, as the phallus length after metoidioplasty is usually insufficient for penetration^[84,85].

Gender-affirming phalloplasty is often a multi-staged procedure in which a tissue flap is used to create a neophallus. The specific stages vary depending on the technique and the surgeon’s preference. Commonly used flaps include the radial forearm (RFFF), anterolateral thigh (ATL), and abdominal flaps, though other techniques are occasionally used (albeit less commonly due to higher risks of donor site morbidity)^[86].

Both phalloplasty and metoidioplasty may be performed with or without urethral lengthening, depending on whether standing urination is desired^[75,86]. While standing urination is a key goal for many individuals seeking masculinizing genitoplasty, it carries significant risks of complications. Indeed, most complications requiring reoperation in both procedures are related to urethral reconstruction, some of which may be acute. Therefore, individuals should consider the tradeoffs between optimizing function and minimizing risks, based on the chosen surgeon and technique^[87-90]. Urinary complications may also affect body image and sexual self-esteem, although this has not been specifically studied.

The clitoris is typically either buried within the neophallus or positioned at its base to preserve erogenous sensation. Additionally, some surgeons may incorporate one of the clitoral nerves into the neophallus flap to improve sensation^[86]. Overall, most patients (94% in one systematic review) report full tactile sensation in

the neophallus, although fewer (~60%) report preserved “erogenous sensation” and sexual function, defined as satisfactory penetrative intercourse^[86]. In the same review, the authors reported 97.4% satisfaction with the cosmetic appearance of neophallus constructed using RFFF, with comparable results (> 95%) for abdominal-based approaches. Literature on orgasmic function post-phalloplasty is limited, but one cohort study of 287 RFFF patients found that 100% achieved satisfactory orgasms postoperatively^[91].

To achieve sufficient rigidity for sexual penetration after phalloplasty, individuals typically require an erectile device. This is most commonly an internal inflatable prosthesis, though malleable prostheses and other options are also available. Unfortunately, data suggest that failure rates for all types of erectile implants are high, with additional risks of erosion through the neophallus or damage during repair and replacement^[92]. These failure rates tend to be higher than those observed with anatomic phalluses, partly due to the lack of the membranes surrounding native erectile tissue, which facilitate device insertion and replacement.

Data on erectile function outcomes with implanted inflatable prostheses is limited, but one systematic review ($n = 15$ studies) reports 51.4%-90.6% patient satisfaction with erectile function and 77%-100% of patients reporting the ability to engage in penetrative intercourse. In general, sexual health outcomes are underreported for phalloplasty, with one recent review noting that they are documented in fewer than half of the relevant studies^[93]. More research is needed to better understand these outcomes.

Patients considering phalloplasty often inquire about ejaculatory function. Although ejaculation is not expected after neophallus construction, some patients report experiencing it in community forums, and patient-facing resources from surgical clinics suggest rates of around 10%^[94,95]. However, literature on this topic is sparse, and it is likely that any ejaculated fluid consists primarily of urine, given the anatomical changes involved. Future research should aim to clarify this outcome, and surgeons performing phalloplasty should assess and document it during follow-up visits.

Sexual health outcomes for metoidioplasty are also under-researched. One systematic review ($n = 14$ studies, 1,455 cases) reported high satisfaction rates and low regret rates. Notably, 100% of patients reported fully preserved erogenous sensation, and 66%-77% retained orgasmic function during intercourse (100% with masturbation). However, 87%-100% of patients reported an inability to engage in penetrative sex due to the anatomy of the microphallus^[96]. As such, metoidioplasty is generally recommended only for individuals who do not desire penetrative sex.

Testicular prostheses are typically implanted in the constructed scrotum during phalloplasty or metoidioplasty as part of the staged procedure. The insertion of testicular prostheses is generally considered low-risk, although complications like migration and erosion can occur^[97-99]. Based on research in cisgender men, testicular prostheses could potentially improve sexual function by alleviating gender dysphoria and boosting sexual self-confidence in those who have undergone genital affirmation surgery. However, we found no research on the effects of testicular prostheses on sexual well-being in transgender men^[100,101]. See [Table 2](#) for a summary of how various GASs may affect sexual health.

THE ROLE OF ADJUVANT THERAPIES IN SEXUAL HEALTH AFTER GAS

Pelvic floor PT may be beneficial in supporting GAS patients throughout the perioperative period. In a systematic review and meta-analysis ($n = 25$ studies, 8,566 cases), Dominoni *et al.* observed variable rates of pelvic floor dysfunction following gender-affirming genital surgery^[111]. Among transgender women who underwent vaginoplasty, pelvic organ prolapse occurred in 1%-7.5% of cases, urinary incontinence in 15%,

Table 2. Potential mechanisms for sexual health effects of gender-affirming surgical procedures, and the level of evidentiary support

Procedure		Potential mechanisms for sexual health effects	Evidence for sexual health effects
Feminizing procedures	Breast augmentation	Increased sexual self-confidence Improved gender dysphoria Chest/breast sensation changes may affect sexual interactions Nipple sensation/function changes depending on surgical technique	Limited evidence, with one prospective study ^[73,102,103]
	Vaginoplasty	Enables gender-congruent sexual activities involving the vagina/clitoris Improved gender dysphoria Possible discomfort related to visible scarring or the aesthetics of external genitalia Risk of dyspareunia and/or pelvic floor dysfunction with sexual penetration and/or dilation Changes in experiences of orgasm	Numerous studies report positive sexual outcomes, including preserved ability to orgasm and clitoral sensation. However, the scope of studied sexual function could be expanded ^[24,30,102,104-117]
	Vulvoplasty	As above, without the possibility of vaginal penetration	Sexual effects are not as well studied, but likely offer similar benefits to vaginoplasty for individuals not interested in vaginal penetration ^[108,118,119]
	Orchiectomy	Reduced medication needs and associated side effects Improved gender dysphoria	Not well studied as a standalone procedure in this context ^[120]
	FFS and tracheal shave	Increased appearance congruence may enhance sexual self-confidence. Facial sensation changes could potentially affect kissing and intimacy, depending on the extent of surgery	Sexual effects have not been studied ^[102]
	Masculinizing chest surgery	Improved sexual self-confidence and reduced anxiety about showing the chest and being touched Improved gender dysphoria Altered or lost nipple sensation/function (may or may not affect sexuality)	Numerous cross-sectional, retrospective and prospective studies address sexuality at least peripherally ^[67,103,121-125]
	Hysterectomy	Improved gender dysphoria, particularly regarding menstrual bleeding, may increase sexual self-confidence Pelvic floor function changes may affect sexuality in some individuals	Sexual effects have not yet been studied in transgender populations. Mixed evidence exists regarding sexual effects in cisgender women undergoing a benign hysterectomy ^[102,126-129]
Masculinizing procedures	Metoidioplasty (including testicular prostheses)	Allows for gender-congruent sexual activities involving the phallus/scrotum Improved gender dysphoria Possible discomfort related to visible scarring or the aesthetics of external genitalia Changes in experiences of orgasm Concerns about urinary function affecting sexuality Insufficient length for penetrative sex may lead some individuals to eventually choose conversion to phalloplasty	Moderate evidence of improvements in sexual function. Many individuals, though not all, report orgasm and satisfactory sexual function post-surgery. Studies indicate higher satisfaction with metoidioplasty than phalloplasty for those not interested in penetration ^[85,87,89,102,130-136]
	Phalloplasty (inclusive of testicular/erectile prostheses)	All concerns listed for metoidioplasty, plus: Concerns about functional issues with erection and penetration; Sensation concerns in the neophallus; Worries about complications; Potential need for revision surgery for urinary or erectile function	Mixed data on sexual function. Sexual satisfaction and the ability to orgasm are common but not universal. Lower satisfaction is often linked to complications and problems with penetration ^[87,87,102,107,133,137-142]

FFS: Facial feminization surgery.

irritative urinary symptoms (such as urgency, frequency, and nocturia) in 20%, and sexual dysfunction of varying severity in 25%-75%. Among transgender men who underwent phalloplasty with hysterectomy, pelvic organ prolapse was reported in 3.8% of patients, urinary incontinence in 50%, irritative urinary symptoms in 37%, and sexual dysfunction in 54%. Only four of the studies reviewed addressed the efficacy

of pelvic floor therapy in alleviating these symptoms. Attendance at pelvic floor PT both pre- and postoperatively was significantly associated with lower rates of pelvic floor dysfunction compared to postoperative therapy alone. Moreover, postoperative PT led to significant improvements in pelvic floor dysfunction among patients who screened positive for symptoms prior to surgery. Therefore, it is important to screen patients for preoperative pelvic floor dysfunction and counsel them on the associated risks. Surgeons should consider referring patients to pelvic floor PT if preoperative symptoms are present or if symptoms develop/worsen postoperatively.

Behavioral health providers also play an important role in supporting the sexual health and function of individuals undergoing GAS throughout the perioperative period. As part of a multidisciplinary team, they are often involved in assessing patients' psychosocial readiness for surgery, addressing both practical concerns (e.g., housing, postoperative support) and mental health (e.g., PTSD that may affect the ability to dilate after vaginoplasty). They may also assist with writing the letters of support required for insurance coverage^[37,143,144]. Additionally, they may work with patients in the preoperative period to develop coping strategies and other skills to enhance readiness for surgery. After the procedure, they continue to provide mental health support and counseling on various psychosocial concerns, including sexual health. Transgender-informed sex therapists can be especially helpful for individuals experiencing sexual health concerns or dysfunction in the postoperative period, including helping patients navigate how to have a fulfilling sexual life in the context of surgical complications^[79,145].

CONCLUSION

GAS is a critical aspect of care for many TGD individuals, significantly influencing sexual health, psychosocial functioning, and overall QOL. The existing literature supports the numerous benefits of GAS (including improved body image/self-esteem, increased sexual function and satisfaction, and reduced gender dysphoria). However, it also highlights the need for appropriate, comprehensive preoperative counseling, which should include discussion about sexual health goals and anticipated outcomes.

This study is limited by its narrative structure rather than being a systematic review, and it is further constrained by the absence of systematically collected sexual outcome data for TGD individuals undergoing GAS^[102]. Despite significant advances in surgical techniques and increased research focus on TGD populations, a major limitation remains the lack of validated, population-specific outcome measures to assess the impact of GAC on TGD patients' health, particularly sexual health. While no measures currently exist that have been well validated or specifically developed for TGD populations, such tools are in development. For example, the GENDER-Q, a patient-reported outcome measure specifically for GAC outcomes, published its initial validation study in April 2025^[146]. Incorporating validated measures like the GENDER-Q into future research and clinical practice will improve the quality and comparability of outcome data and ensure that patient voices are meaningfully integrated into care.

As the demand for GAS continues to grow, physicians and researchers must focus on outcomes that matter most to patients. These include not only the technical success of surgical procedures but also long-term sexual well-being, relational intimacy, and psychosocial flourishing. Such goals are highly individual and require intentional assessment to determine whether they are realistic and aligned with the surgical plan. Sexual health should not be viewed as a peripheral concern - it is a central dimension of human health and dignity. Therefore, it must be: (1) treated as a core outcome in both research and clinical care; (2) integrated into our broader understanding of QOL; and (3) supported with the same rigor and empathy applied to other domains of health. To achieve this, improved training is needed across both undergraduate and graduate medical curricula to enhance provider competency and comfort in engaging in affirming,

informed discussions about sexuality and health^[147,148]. For this training to be effective, it must go beyond the discreet effects of surgery on sexual function and explore the broader ways in which physical and mental health, as well as the social environment, contribute to sexual health - not only for TGD individuals but for the population as a whole^[21,149-152].

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Authors' contributions

Made substantial contributions to the conceptualization, wrote the first draft, and assisted with editing: Billings HM

Made substantial contributions to the conceptualization and edited and revised the manuscript for publication: Boskey ER

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Boskey ER is a Junior Editorial Board member of the journal *Plastic and Aesthetic Research*. Boskey ER was not involved in any steps of editorial processing, notably including reviewer selection, manuscript handling, or decision making. Billings HM declared that there are no conflicts of interest.

Ethical approval and consent to participate

Not applicable.

Consent for publication

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