ARTICLE

Foreskin restorers: insights into motivations, successes, challenges, and experiences with medical and mental health professionals – An abridged summary of key findings

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Demographically diverse surveys in the United States suggest that 10–15% of non-voluntarily circumcised American males wish that they had not been circumcised [1, 2]. Similar data are unavailable in other countries. An unknown proportion of circumcised males experience acute circumcision-related distress; some attempt to regain a sense of bodily integrity through non-surgical foreskin restoration. Their concerns are often ignored by health professionals. We conducted an in-depth investigation into foreskin restorers' lived experiences. An online survey containing 49 qualitative and 10 demographic questions was developed to identify restorers' motivations, successes, challenges, and experiences with health professionals. Targeted sampling was employed to reach this distinctive population. Invitations were disseminated to customers of commercial restoration devices, online restoration forums, device manufacturer websites, and via genital autonomy organizations. Over 2100 surveys were submitted by respondents from 60 countries. We report results from 1790 fully completed surveys. Adverse physical, sexual, emotional/psychological and self-esteem impacts attributed to circumcision had motivated participants to seek foreskin restoration. Most sought no professional help due to hopelessness, fear, or mistrust. Those who sought help encountered trivialization, dismissal, or ridicule. Most participants recommended restoration. Many professionals are unprepared to assist this population. Circumcision sufferers/foreskin restorers have largely been ill-served by medical and mental health professionals.

IJIR: Your Sexual Medicine Journal (2023) 35:309–322; https://doi.org/10.1038/s41443-023-00686-5

SURVEY HIGHLIGHTS

Q14: 25% of respondents were aware by age 12 of harms they attributed to circumcision (6.5% by age 7).

Q15: 43% of respondents became aware of restoration after stumbling across it on the internet.

Q16: 16% began restoration before the age of 19; 34% between ages 20 and 29.

Q20: Length of time spent on restoration ranged from less than 6 months to more than 11 years.

Q25: Before starting restoration, 65% reported feelings of circumcision-related dissatisfaction or distress.

Q27: 22% reported engaging in sexually compulsive behavior as a coping mechanism for their sexual dissatisfaction and/or emotional distress.

Q29: 69% of restorers reported that restoration increased their sexual pleasure.

Q31: Most partners either supported (46%) or were neutral (45%) about respondents' restoration efforts.

Q32: 25% reported that restoration improved their relationship (mostly sexually) and <6% stated it had worsened their relationship, with the majority saying it had no effect on the relationship either way.

Q37: 67% said they would be "very interested" or "somewhat interested" in restoration methods involving regenerative medicine.

Q41: Only 13% of respondents sought help from a medical or mental health professional.

Q42: 57% of those who sought no help believed the professional would not be knowledgeable or supportive.

Q44: Of those who sought professional help, 25% reported that the professionals were unsympathetic, dismissive or ridiculing.

Q45: 69% believed professionals are insufficiently aware of or compassionate toward circumcision sufferers/foreskin restorers; 64% believed professionals are unaware of foreskin anatomy or circumcision harm.

Q47: 83% believed that medical and mental health professionals should receive special training on the issues of circumcision distress and foreskin restoration.

Q48: 87% of restorers would recommend foreskin restoration to others.

Q51: Over 60 birth countries were represented by respondents; mostly from the US, Canada, the United Kingdom, Australia, and Germany.

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Received: 18 October 2022 Revised: 21 February 2023 Accepted: 27 February 2023
Published online: 30 March 2023

Q55: Most respondents reported being born into Christian, Jewish or Muslim families; however significantly fewer still identified with those religions (Q56).

Q58: Restorers identified their sexual orientation as straight (47%), gay (33%), bisexual (19.5%), and ~1.5% identified themselves as transgender women.

INTRODUCTION

Non-therapeutic (i.e., ritual, cultural) genital cutting of male and female children (MGC, FGC) has been practiced by a range of human societies since ancient times, often in parallel ceremonies, servicing various functions including socio-functional (e.g., age-group bonding, maintenance of intergenerational hierarchies), religious/mythological, gender-normalizing, and (other) practical and symbolic purposes [3, 4] pp57 & 101, [5] p105].

In recent times, such non-therapeutic practices, typically carried out on a non-voluntary basis on minors, have become partly medicalized in some high-prevalence countries (e.g., FGC and MGC in Malaysia, MGC in the United States), meaning that they are practiced by health professionals despite divergence from the canonical purpose of surgery: "diagnostic or therapeutic treatment of conditions or disease processes" [6]. Wherever FGC is a common practice, MGC is performed in the same communities, but not vice versa (i.e., many communities practice only MGC). The United States is one of a minority of countries globally with low-prevalence FGC but high-prevalence MGC.

An estimated US annual incidence of in-hospital non-therapeutic newborn penile circumcision is 1.2 to 1.3 million [7, 8], with religious ceremonies and private clinics likely increasing the incidence to 1.5 million [9]. Consequently, from 1960 to 2010, 60 to 75 million childhood circumcisions likely occurred, plus an unknown number of adult circumcisions. It is unknown what percentage of those individuals experience circumcision distress involving resentment (or regret, after adult circumcision). Conservatively, if even one-tenth of 1% of those are assumed to experience circumcision distress sufficient to motivate them to regain their bodily integrity, there could be 60,000 to 75,000 active or potential/willing foreskin restorers currently in the US. Prospectively, based on the same assumption, 12,000 to 15,000 males are born and circumcised each year who may develop sufficient circumcision distress to pursue or be open to pursuing foreskin restoration, a gentle but time-consuming non-surgical method of skin expansion that approximates the functions of the original prepuce (i.e., glans protection, gliding function through tissue motility, lubrication and sexual pleasure).

According to a nationally representative Foregen/YouGov survey, more than 5 million US men could be interested in foreskin restoration if a quicker, less tedious restoration method involving regenerative medicine became available [10].

The earliest circumcision reversal procedures occurred in the Hellenistic period to assist either the circumcised, or those born with deficient or no prepuce (*aposthia*), to cover their bared glans to gain social respectability in Greek society [11]. Surgical foreskin restoration attempts occurred in the 1960s through 1990s [12–14], however, no study has systematically evaluated the efficacy of any reconstructive procedures [15]. A more detailed history of foreskin restoration, including previous studies of foreskin restorers, is available in the Unabridged Supplement to this article (Sections "The Long Historical Search for Wholeness"–"Prior Research on Restoration Motivations and Results").

Contemporary non-surgical foreskin restoration employs gentle skin expansion to regrow remaining penile shaft skin forward over the glans using commercial devices. For example, one consists of a stainless steel weight that affixes to penile shaft skin, allowing gravity to create tension, while another consists of a conical device covering the glans that secures penile shaft skin between silicone components (Fig. 1A–D).

A distinct subset of circumcised males has been identified that experiences distress over their circumcised condition [16, 17], some of whom seek foreskin restoration. We aimed to survey this population to understand participants' restoration motivations and goals, communications with others, and their lived experiences.

METHOD

An Institutional Review Board approved all research for data collection (Protocol #04421, Quinnipiac University). Participants were provided an informed consent page prior to starting the survey, noting that they were free to stop any time, and that further participation implied on-going consent.

To reach this geographically dispersed, distinctive population, we employed targeted sampling methods. While this provides important qualitative insights into a hard-to-reach understudied community, due to non-random recruitment our results cannot be generalized beyond the sample obtained (e.g., to all foreskin restorers or to circumcised males in general).

In addition to asking commercial restoration device manufacturers to email their past customers with a survey invitation and to post news of the survey on their websites (e.g., American Bodycrafters/ForeskinRestoration.info, TLC Tugger.com), we posted news of the survey to online restoration forums (e.g., Reddit.com/r/foreskinrestoration, r/CircumcisionGrief), restoration support groups (e.g., National Organization of Restoring Men, 15 Square), and genital autonomy organizations (e.g., Doctors Opposing Circumcision, Intact America).

Participants

The survey, in English, Spanish, German, and French, launched 22 June 2021 and remained open for 100 days. 1790 fully completed and 331 partially completed surveys were submitted by participants from 60 countries. We report only results from the fully completed surveys.

Most respondents were born in the United States ($n = 1298$, 72.51%), Canada ($n = 107$, 5.98%), the United Kingdom ($n = 87$, 5.64%), Australia ($n = 60$, 3.35%), Germany ($n = 41$, 2.29%), or France ($n = 26$, 1.45%). Ages ranged from 18 to 60+, with Christianity as the majority parental religious affiliation ($n = 1322$, 73.85%) and Agnostic/Atheist as the majority current participant affiliation ($n = 512$, 28.60%). Most participants identified as White ($n = 1658$, 92.63%) and as Straight/Heterosexual ($n = 839$, 46.87%), followed by Gay/Homosexual ($n = 589$, 32.91%) and Bisexual or Pansexual ($n = 350$, 19.55%). Although all participants were born with a penile phallus and almost all identified as males/man, a very small minority identified as Transgender ($n = 27$, 1.51%), Intersex ($n = 3$, 0.17%), or Non-Binary/Fluid ($n = 75$, 4.19%). Complete demographic information is available in the Unabridged Supplement (Sections "Participants" and "Demographics").

Survey construction

An online survey tool was developed containing 49 qualitative questions regarding motivations, successes, challenges, and experiences with medical and mental health professionals. The survey also contained 10 demographic questions. Survey questions were generated from inquiries used by the lead author in previous surveys, many of which were motivated by decades of the lead author's listening to the lived experiences of circumcision sufferers and foreskin restorers in support groups and online communities. All precisely worded questions are presented in the Unabridged Supplement (Sections "Survey Questions"–"-Research Question 3. What Were Restorers' Experiences with Medical/Mental HealthProfessionals, or Why Didn't They Reach Out?"). Participants were also given an opportunity to upload up to five restoration progress photos and were advised that by doing so they consented to the possibility of the photos being used in published survey findings.

To help participants accurately identify and report adverse physical impacts from MGC, images of intact penile anatomy and common circumcision outcomes (Fig. 2a–e) were included.

To estimate how much glans coverage respondents had pre-restoration, and the coverage they sought, respondents were directed to the Coverage Index chart [18].

Fig. 1 Foreskin restoration devices. Row 1: **A** Penile Uncircumcising Device/PUD; **B** Product as worn Row 2: **C** TLC Tugger; **D** Product as worn with optional strap.

To deepen our understanding of the various ways that unwanted circumcision and the desire for foreskin restoration can impact one's sexual health, we utilized Dailey's *Circles of Sexuality* (Supplementary Fig. S5). These circles, which are explored in greater detail in the Discussion section, involve the experiential spheres of sensuality, intimacy, sexual identity, sexual health and reproduction, and sexualization. We acknowledge that, for some, the experiences of circumcision and foreskin restoration are limited to one sphere, but for many others, their experiences overlap multiple spheres in complicated ways that are, as yet, not fully examined or understood.

RESULTS[1]

Research question 1. What motivates people to seek/pursue foreskin restoration?

To assess motivations for restoration, participants were first asked if they experienced any sense of resentment for having been circumcised without their consent as a child (Q6), to which 83.85% responded in the affirmative. When asked if they experienced regret (Q8), this question did not apply to the majority of participants (94.64%), but of the remaining respondents who freely chose to be circumcised as an adult (~6%), 80% of those responded that they immediately regretted their decision and still regret it.

Next, when asked about the severity of their circumcision (Q9) using the Coverage Index chart, 37.93% of participants self-reported a C-1 severe circumcision (e.g., no tissue mobility when erect, causing skin tightness and/or pain); 55.64% disclosed a C-2 to C-3 moderate circumcision (e.g., enough loose tissue when erect to only glide along the shaft but not the glans/head); and 6.42% reported a minimal C-4 circumcision (e.g., enough loose tissue when erect to partially or completely pull over the glans/head).

Participants were then asked about physical damage (Q10) and sexual, emotional and self-esteem injuries (Q11–Q13). Fifteen distinct types of physical harms were reported by participants (Q10), which are detailed in Table 1 and are given greater meaning within the context of the *Circles of Sexuality* as described in the "Discussion" section.

Participants were then asked their age at first awareness of circumcision harm (Q14, Table 2) and source(s) of this first awareness (Q15). The majority of respondents reported being aware of circumcision harm between ages 13–19 ($n = 540$, 30.17%), with some respondents who became aware between ages 7–12 ($n = 331$, 18.49%) and others who reported becoming aware before age 7 ($n = 116$, 6.48%). Notably, the majority of participants (91.62%) first became aware of their harm from various sources and were not influenced by the intactivist movement (i.e., political activities and resources dedicated to

[1]Note that any results totaling more than 100% are the result of participants' ability to select more than one response for that question, specifically regarding Q1, Q5, Q7, Q10-13, Q17, Q24, Q25, Q27, Q33, Q34, Q40, Q42, Q45, Q57 and Q58.

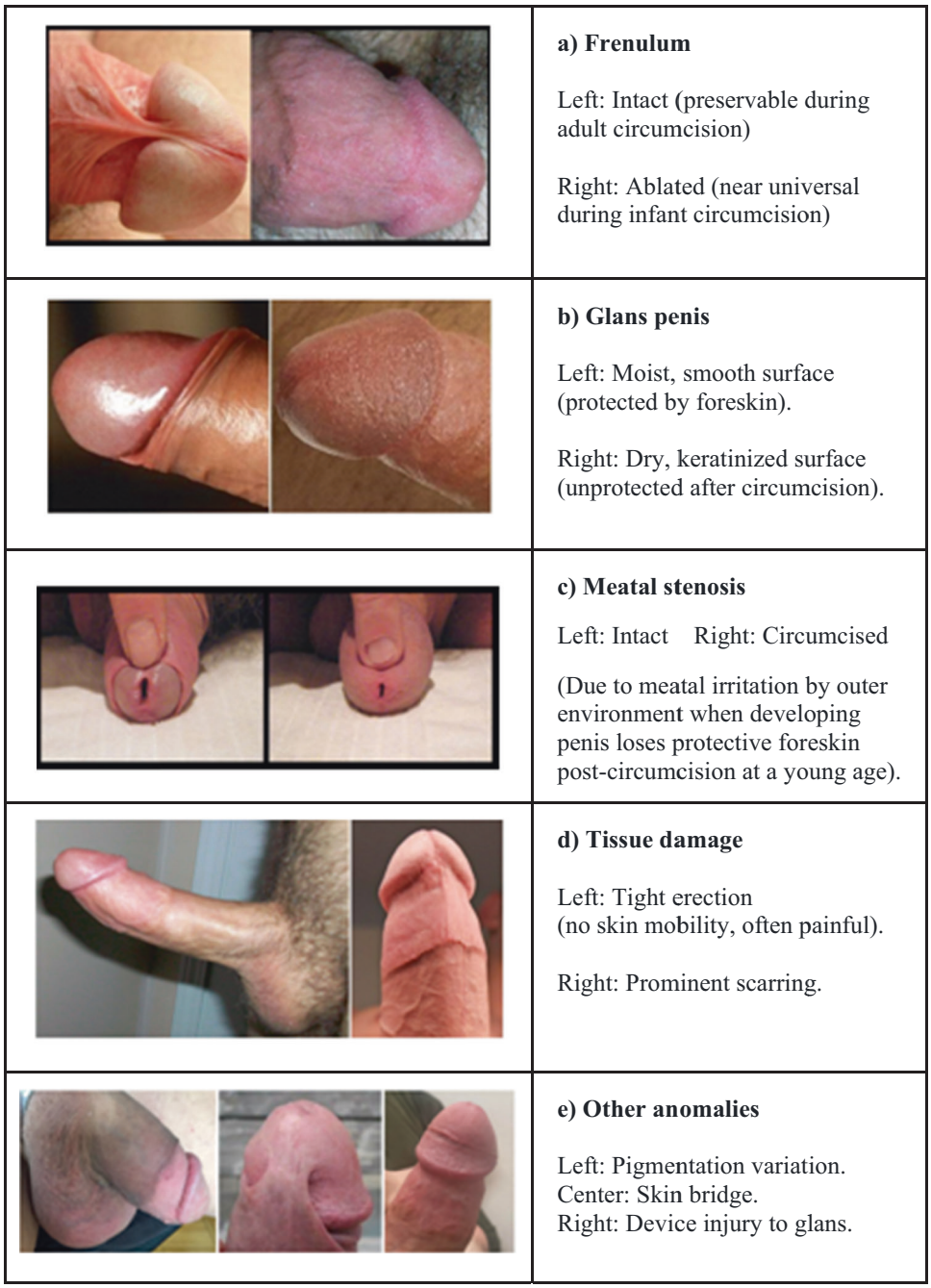

Fig. 2 Types of Circumcision Damage. a Frenulum (**b**) Glans penis (**c**) Meatal stenosis (**d**) Tissue damage (**e**) Other anomalies.

opposing/ending medically unnecessary childhood genital operations). Only 8.38% reported intactivism as a source of awareness of their harm.

Motivations

The bulk of participants (69%) reported starting foreskin restoration between ages 20 and 49–with a clear majority (34%) starting in the 20–29 age range–while almost 15% started the process after age 50, and almost 8% starting around age 18 or 19. Surprisingly, almost 8% of respondents stated they began restoring before age 18, with one participant admitting "I started restoring in elementary school."

Most participants' motivations for seeking restoration (Q17, Table 3) were: increased glans sensitivity (79.83%); enhanced sexual pleasure (78.16%); and protecting the glans from the outer environment (74.97%).

Research question 2. What were/are their restoration experiences and results?

Participants' restoration goals were queried (Q18). A precise percentage breakdown for each type of coverage goal appears in the Unabridged Supplement (Section "Personal Experience", Table S5), however, a deeper examination of the types of coverage goals, and possible rationale for each, appears herein under the "Discussion" section. For restoration stage at time of survey (Q19), 76% reported their restoration was ongoing. One participant submitted a photographic series documenting his 5-year progress from a CI-3 to CI-9+ (Supplementary Fig. S4).

Table 1. Physical, sexual, emotional/psychological, self-esteem damage attributed to circumcision motivating respondents to begin foreskin restoration (Q10–Q13).

Physical		Sexual		Emotional/Psychological		Self-esteem	
Response option	**Response percent**	**Response option**	**Response percent**	**Response option**	**Response percent**	**Response option**	**Response percent**
Dry, keratinized glans	72.74%	insensitive glans	62.68%	frustration	58.94%	felt less whole	59.22%
Partial/total loss of foreskin	64.30%	excess stimulation needed to achieve orgasm	47.88%	anger	51.28%	felt inferior to those with an intact foreskin	55.25%
Partial/total loss of frenulum	57.77%	delayed orgasm (I can't come when I want to)	28.10%	dissatisfaction/distress over my condition	46.93%	felt mutilated	49.55%
Pubic hair drawn onto shaft	49.55%	none	21.34%	human rights violated	45.87%	felt damaged	47.21%
Scarring (prominent)	44.75%	premature orgasm (I come too quickly)	13.63%	betrayal by doctor	37.99%	felt abnormal/unnatural	40.45%
Scrotal webbing	44.36%	scar is numb	9.83%	betrayal by mother	36.76%	ashamed/fearful to let others (esp. partners) see my penis	25.25%
Skin tone variance	43.85%	erectile dysfunction (untreated)	9.11%	betrayal by father	34.25%	body eudysmorphia (persistent concern about a true defect in my genital anatomy)	23.46%
No shaft skin mobility, or tight, painful erections	40.89%	scar is painful	6.20%	body violated or raped	32.74%	none	21.90%
Scarring (uneven)	29.89%	erectile dysfunction (treated with medication or devices)	5.47%	embarrassment	30.50%	other	1.01%
Skin tag/s	24.19%	circumcision scar bleeds during sex	2.40%	shame	28.77%		
Shaft curvature (any direction) when erect, not due to recent injury	20.84%	scar is too sensitive	2.35%	none	20.61%		
Meatal stenosis	18.38%	Other	9.50%	alexithymia (trouble identifying or expressing feelings and/or emotions)	16.31%		
None	7.60%			thoughts of revenge or doing harm to my circumciser	15.31%		
Skin bridge/s	5.75%			suicidal thoughts	13.07%		
Gouge/s on the glans	3.52%			spiritual trauma	9.66%		
Device injury to glans	1.79%			thoughts of revenge or doing harm to parent(s)/ guardian who consented to my circumcision	8.32%		
Other	2.12%			recurrent nightmares	6.59%		
				betrayal by religious circumciser	2.79%		
				betrayal by tribal elders	0.84%		
				other	6.76%		

The 18.83% of respondents who abandoned restoration were asked why (Q24), with top responses being: too much trouble/too difficult (39.76%); didn't reach desired result/abandoned hope (24.33%); and lost patience (21.96%).

When asked about pre-restoration feelings (Q25), top responses were: dissatisfaction/distress (65.47%), depression (33.46%), and hopelessness (31.4%). When asked if restoration had changed those feelings (Q26) 74.82% reported some easing or elimination.

Among prior coping behaviors for distress (Q27) participants cited smoking, alcohol/drug use, self-harm, compulsive eating, or compulsive sexual behavior (i.e., increased number/frequency of sexual encounters to compensate for poor quality sexual experiences). The most common coping behavior was sexual compulsivity (21.96%) with the next most prevalent being alcohol use (10.45%). When asked about restoration's effect on those behaviors (Q28) almost two-thirds (61.55%) reported those behaviors were decreased or eliminated entirely.

When asked about changes in penile sensation from restoration (Q29) most (69.11%) reported increased pleasure.

Interest in regenerative medicine for foreskin restoration (Q37) revealed 67% were either somewhat or very interested, especially if economically feasible.

Research question 3. What were restorers' experiences with medical/mental health professionals, or why didn't they reach out?

When asked if respondents knew other restorers (Q38) 32.29% said yes and 67.71% said no.

When questioned about which non-professionals participants had spoken with (Q40), respondents said: no one (30.39%); a partner/significant other (49.66%); friend(s) (41.47%); family (17.49%) and someone else (6.20%).

When asked about which professionals they had spoken with (Q41), responses yielded: no one (86.76%); medical professional (e.g., urologist, primary care physician, plastic surgeon) (8.99%); mental health professional (e.g., psychologist, psychiatrist) (4.47%); sexologist/sex therapist (1.01%); spiritual counselor (0.28%), or someone else (0.39%).

Reasons for not speaking with professionals (Q42) included: felt hopeless/didn't think professionals would be knowledgeable or supportive (56.95%), embarrassment (39%) or feared ridicule (30.53%).

Gender of the professionals spoken with (Q43) was 62.02% male. Participants noted the professionals' attitudes (Q44, Table 4).

Top responses about obstacles to seeking professional help (Q45) included: professionals insufficiently aware/compassionate toward restorers (69.94%); professionals insufficiently aware/compassionate toward MGC sufferers (69.39%); and professionals insufficiently educated/knowledgeable about foreskin anatomy/functions or about circumcision harm (64.41%).

When asked if professionals need to become familiar with circumcision distress and foreskin restoration issues (Q46), 92.63% responded affirmatively. When asked if professionals need special training to work with foreskin restorers (Q47), 82.85% responded yes. A majority would recommend restoration to others (Q48 & Supplementary Table S6).

When asked about sexual orientation/gender identity (Q58), participation by gay and bisexual men combined was 51.9%. A very small proportion of respondents identified as transgender women (1.45%) or intersex persons (0.17%).

Table 2. Age at first awareness of circumcision harm (Q14).

Response option	Response percent	Response count
I don't recall/not applicable	5.53%	99
Before age 7	6.48%	116
7–12	18.49%	331
13–19	30.17%	540
20–29	23.85%	427
30–39	7.09%	127
40–49	4.64%	83
50–59	2.79%	50
After age 60	0.95%	17

DISCUSSION

Demographics

As noted in the "Methods" section, most respondents selected their birth country (Q51) as the United States. This is unsurprising since the US has the highest rate of non-therapeutic, non-religious neonatal MGC [19], compared to the other Anglophone nations previously mentioned that also share a history of MGC, which began during the Victorian era (i.e., as part of anti-masturbation campaigns [5].

As in previous surveys, the representation of gay and bisexual men was significantly higher than in the general population. The reason for this is uncertain. It is possible that gay and bisexual men (i.e., men who have sex with men and thus for whom male genital anatomy plays a distinctive role in sexual attraction and experience) might be more attuned to questions around bodily autonomy, including with respect to penile anatomy, specifically, as well as voluntary vs. non-voluntary

Table 3. Motivations for seeking foreskin restoration (Q17).

Response option	Response percent	Response count
To enhance sexual pleasure	78.16%	1399
To increase glans/head sensitivity	79.83%	1429
To improve aesthetics or appearance	73.30%	1312
To hide circumcision scarring	32.63%	584
To protect the glans (penile head) from the outer environment	74.97%	1342
To resolve anger, resentment, or negative emotions over my circumcision	46.65%	835
To improve body image and/or increase self-esteem	63.46%	1136
To regain sense of control over my body	54.25%	971
Suggestion or recommendation by significant other, friend, relative	3.58%	64
Other (Please specify; 100 character limit)	3.97%	71

Table 4. Attitudes toward foreskin restorers among medical or mental health professionals from whom help was sought (Q44).

Response option	Response percent	Response count
Sympathetic or helpful	33.65%	70
Neutral or nonjudgmental	29.33%	61
Unsympathetic, dismissive, ridiculing, unhelpful	25.00%	52
Attitudes varied because I went to more than one professional	12.02%	25

modifications thereof.[2] For example, gay/bisexual respondents reported that awareness of adverse effects they experience from MGC is heightened during sexual activity with circumcised or intact partners, either of which can amplify feelings about their own genital loss.

Some individuals who were assigned male at birth (i.e., transgender or intersex persons) may feel victimized by binary gender-based normalizing surgery [21, 22], which may be compounded where MGC is culturally endemic.

Effects of non-therapeutic childhood penile circumcision on transgender respondents may be illustrated with the following sampling of comments:

> "I'm trans, I need that flesh…"

> "My surgeon used the restored tissue to create a sensate clitoral hood"

> "Yep, transgender woman restoring her dick, wild right?"

Attempts by the lead author to glean more information about the transgender experience by contacting transgender activists and professionals during the survey period and prior to publication of this paper went unanswered. However, since foreskin restoration can be beneficial to some transgender women in helping to reach their goals for gender-affirming surgery, further research across non-heterosexual and non-binary identities or orientations is needed to understand experiences of circumcision harm, dissatisfaction, distress, and engagement with foreskin restoration in this distinctive population (Supplementary Section "Transgender Women and Intersex Persons").

With respect to religion, current reported religious identity/affiliation of participants was markedly lower than their reported religion-of-rearing, especially among Jewish, Christian and Muslim respondents (Supplementary Sections "Participants" and "Religious identification"). Participants frequently cited the role of circumcision in these religions as a factor for their abandonment of religion. Further research is merited into the degree to which childhood circumcision may have any lasting negative impact over time upon adult religious identity or allegiance.

Research question 1. What motivates people to seek/pursue foreskin restoration?

Circumcision of the newborn or young child (i.e., on a smaller organ that has not fully developed) is a delicate procedure that risks widely variable experiences of harm. The concept of harm is understood differently in different disciplines and spheres of life. Moreover, application of the concept varies from individual to individual (i.e., what one person experiences or interprets as an enhancement or a harm may not be recognized as such by another). From a medico-legal perspective, however, it is notable that bodily surgeries are considered harmful per se, such that they can only be justified, if not by one's own consent, then by circumstances of medical necessity (i.e., necessary to avoid an even greater harm). As a result of litigation brought by an individual who was subjected to successful but needless nasal-sinus surgery, a California court ruled that "Even if a surgery is executed flawlessly, if the surgery were unnecessary, the surgery in and of itself constitutes harm" [23]. In addition to this legally recognized intrinsic harm, non-therapeutic child circumcision also risks contingent harm, for example via surgical complications. Due to inadequate data, however, the American Academy of Pediatrics (AAP) has twice acknowledged that the precise risk and full extent of such complications are not known [24] p 390, [25] p e772][3].

Because the inner foreskin firmly adheres to the penile glans at birth, and only separates slowly with maturity (Box 1), neonatal MGC disrupts this developmental process by prematurely and traumatically separating these structures, resulting in further variation in outcome and injury (Box 2).

Physical damage–in addition to the destruction of the prepuce itself–can include excessive skin removal causing tight, painful erections; meatal stenosis [30]; prominent or irregular scarring; numb, hypersensitive, or painful scars; unsightly scar pigmentation; unaesthetic and/or painful skin bridges; gouges in and/or toughening of the penile glans; and an array of other issues [31–33].

Physical harms (Q10, Table 1). As mentioned in the "Results" section, almost 20% of participants reported meatal stenosis. Previous studies have estimated that the rate of meatal stenosis, due to exposure of the urethral meatus through removal of its protective preputial covering, occurs in 5–20% of neonatally circumcised males [30, 34, 35], and is a permanent condition

[2]A peer reviewer has asked us to elaborate, and we do so briefly here. While heterosexual males may be visually familiar with penile aesthetics through partially-mediated experiences (e.g., watching pornography; seeing male genitalia in changing rooms at some distance), gay/bi men likely have broader and/or less-mediated experiences with circumcised and intact penises in the context of intimate interpersonal encounters, allowing for multi-modal comparisons (i.e., via sight, touch, smell, taste and even sound). In addition, concerns around bodily autonomy may be of heightened significance for gay/bi men in relation to such matters as what may be done to one's body–vis-à-vis threats of medical or psychological "conversion therapies", arrest or imprisonment under sodomy laws, hate-motivated violence, and so on. As such, long-standing LGBTQ + concepts of body ownership and bodily autonomy may foster a deeper awareness, understanding, and/or sensitivity to issues that lie at the intersection of sexuality and human rights [20]. For further analysis, see Unabridged Supplementary Section "Gay/Bisexual men".

[3]Although numerous immediate and short-term complications have been documented [26, 27], there is no universally accepted definition among professionals of what constitutes a circumcision "complication", especially in the un(der)-investigated long-term. Nevertheless, a systematic review concluded that neonatal penile circumcision complications are likely more common than is typically surmised [28]. Many complications are never recorded because they become evident only as the penis develops. An analysis of medicalized MGC found a complication rate of 4% and that adult complications are *not* greater than infant complications [29].

Box 1. Foreskin: form follows function

(for corresponding references see Unabridged Supplement)

All human and non-human primate species, regardless of sex, possess a genital prepuce, an evolved structure that "is likely to be over 100 million years old" [76 p34]. Human penile and clitoral prepuces are undifferentiated in early fetal development, emerging from a genital tubercle capable of penile or clitoral development [77].

At birth, the inner penile foreskin is firmly adherent to the penile glans (head). They separate slowly as the penis matures, sometime between birth and adolescence [78–82]. Widespread medical ignorance of this normal developmental process leads to over-diagnosis of phimosis and needless circumcisions [79, 83] despite the existence of more cost-effective and tissue-sparing treatments [84,85].

Functioning with other external genital structures, the human prepuce offers integral coverage for the glans penis and clitoris, internalizing each and "decreasing external irritation and contamination" [76]. The penile prepuce protects the urinary opening from abrasion, which exits the penile, but not the clitoral glans [86].

Secretions from the inner mucosal prepuce offer immunological defense against pathogens [76,87]. "Langerhans' cells (LCs) are a specialized subset of antigen-presenting cells in the epidermis of the skin and mucosal tissues of the vagina and foreskin. They provide a barrier against entry of pathogens, thereby protecting against disease. …LCs are not efficiently infected with HIV-1 and do not transmit virus to T cells" [88].

The penile prepuce "…is highly dynamic and biomechanically functions like a roller bearing during intercourse, "unfolding" and gliding as abrasive friction is reduced and lubricating fluids are retained" [89]. The penile prepuce cushions and lubricates during sexual activity, particularly during intromission [90, 91 p7].

The densely innervated frenulum, often ablated during newborn circumcision but usually spared in adult circumcision, is highly sensitive to light touch and has been called a male "G-spot" [92,93].

The human penile prepuce is a long-evolved, complex, and functional organ with a unique structure possessing many beneficial physiologic attributes [91 pp vii, 1, 35, 37, 44, 51, 53, 54, 101].

Box 2. Tissue loss from circumcision

(for corresponding references see Unabridged Supplement)

In a cadaver study, the mean surface area of the prepuce when unfolded was 46.7 cm^2 [120]. A later study of excised tissue from newly circumcised men reported the inner and outer adult penile preputial surface area ranged from 7.0 to 99.8 cm^2 [133]. A landmark study of the prepuce found that "[T]he mean length of prepuce… covered 93% of the mean penile shaft" concluding that newborn circumcision often removes "51% of the mean adult penile shaft", typically ablating 1/3 to 1/2 or more of the penile skin that "is more than most parents envisage from pre-operative counseling." [134].

Regardless of sex, the prepuce is "a specialized, junctional mucocutaneous tissue which marks the boundary between mucosa and skin [similar to] the eyelids, labia minora, anus, and lips … The unique innervation of the prepuce establishes its function as an erogenous tissue" [76], making it essentially "the functional end" of the penile skin [135]. "The penile prepuce has a highly organized, dense, afferent innervation pattern that is manifest early in fetal development" [136]. Afferent neurons, typically associated with specialized sensory receptors, are nerve fibers responsible for bringing sensory information from the outside world into the brain.

"Ridged bands" on the inner mucosal surface of the penile prepuce, the peaks of which are rich in Meissner's corpuscles [134], make that surface the most sensitive part of the penis, both to light touch stimulation and sensations of warmth and movement, while the ability of the penile prepuce to re-cover the glans during sexual activity likely mediates excessive stimulation, thereby playing a valuable role in controlling ejaculatory reflex [137–142]. Stimulation of the ridged bands is virtually assured by interactions between the penile prepuce and the coronal ridge of the penile glans [143], as well as by vaginal or rectal walls.

Regardless of sex or gender, genital cutting effects are highly individualistic. While "it's hard to study subjective sexual experiences using scientific instruments" [144], the undeniable anatomical and physiological consequences of penile circumcision will affect sexual experience to various degrees.

unless remedied through surgery. Participant comments about physical harm included:

> "Didn't know why mine was different colors and had a bad scar"

> "Extreme pain with every erection"

> "Pain and bleeding during sex"

Physical harms can adversely affect sexual experiences and self-esteem, leading to emotional issues and ultimately mental health and quality of life challenges.

Sexual, emotional/psychological harms and effects on self-esteem (Q11–Q13, Table 1)

Circumcision and the five circles of sexuality: *Circles of Sexuality* [36] and Supplementary Fig. S5] is a well-established theoretical construct of multiple overlapping facets of human sexuality used by sexuality researchers, educators, and therapists.

Most respondents reported multiple undesired effects from circumcision, which were often motives for restoration. One respondent reported frustration from glans discomfort when it rubs against garments. This can be understood not only in the *sexual health and reproduction* circle, but also in the *sensuality* circle with its effect on sensory experiences with his penis; the *sexual identity* circle when considering his feelings of frustration toward his penis and how it impacts his overall sense of gender; and the *intimacy* circle as we consider impacts on his feelings and challenges of sharing his body with partners. The *sexualization* circle may also apply, insofar as these outcomes, relating to adult sexual life, are ultimately the result of a non-consensual (and medically unnecessary) intervention performed on his sexual organs as a child.

First circle: sensuality. This involves internal physical, cognitive, and emotional experiences with sexuality and experiences of sexual response. Participants described how these disruptive sensations directly impacted their experiences.

> "Irritation and discomfort from meatus and urethra hole rubbing against clothing"

> "Orgasm is a bodily function. It's not supposed to be very difficult to do. The less satisfying it is, the more you seek that satisfaction. It's not supposed to be an exercise in frustration"

> "I was careless to be rough with my penis because I had to be rough to feel pleasure"

Others identified struggles with masturbation, needing excessive lubricant and feeling decreased pleasure. Still others described painful sensations accompanying erection from tightened shaft skin, painful tearing, and bleeding.

In relation to FGC, it has been theorized that cutting of the vulva causes neural network reorganization which then modifies sensory perception [37]. Analogously, it has been proposed that MGC results in changes within a male's somatosensory cortex [38, 39]. In both cases, the brain and spinal cord likely respond to genital cutting as they would to any loss of neural targets or inputs: by rearranging neural networks which, in turn, affect neural signaling to target structures and modify sensory perception. This can help us better understand how genital cutting may modify sexual sensation or experience in persons with different sets of sex characteristics. However, the role of gendered social attitudes (e.g., boys should be stoical, unfeeling; girls are delicate, emotional) may inspire different responses to a child's genital injury (i.e., female sexual deprivation is often viewed negatively, while male sexual deprivation is often viewed as positive, harmless or emphatically denied), which may in turn differently influence individuals' sensation schema (i.e., what they pay attention to, whether they notice certain bodily sensations, how they interpret what they feel or are socially permitted to speak about, and so on) [40–44].

Second circle: intimacy. This involves experiences with emotional closeness, vulnerability, and trust. Preliminary research on a possible association between circumcision and alexithymia (difficulty identifying/describing feelings) reported that "circumcised men had age-adjusted alexithymia scores 19.9 percent higher than intact men" [45]. In the present study, 16.26% of respondents attributed alexithymia to their unwanted circumcision (Q12).

Other respondents discussed experiences with how altered or reduced sensitivity, or sensory irritation to the exposed glans, impacted the sensuality circle in ways that indirectly affected the sexual response cycle and intimacy.

> "(When I) got my first hand-jobs, they were painful, realized it's because of the lack of skin - but didn't link that to the insensitivity yet"

> "Performed sexually too fast to feel"

> "Masturbated more, made love less"

Within the intimacy circle, several respondents identified complaints that sexual partners had about their circumcised bodies, including difficulties achieving orgasm, dryness, chafing, and struggles with penetration.

Third circle: sexual identity. This circle addresses self-knowledge and sexuality, including sexual orientation, gender identity, and sense of self in relation to one's own sexual experiences. Many participants identified feeling inadequacy in various respects due to circumcision. Others felt that their penises were mutilated and deformed, which they associated with decreased sexual self-esteem.

> "My first time having sex was senior year of college. I had other opportunities prior, but could never get myself to do it because I was so worried that the girl would think something was wrong with my penis. (I had a prominent skin bridge)"

> "Avoiding sexual activity for many years because of shame and self-esteem over how my circumcision looks"

> "I feel alone, because very few people have any empathy for my situation and [they] believe that circumcision was for my own good"

> "I just want to be whole. I can't express how much pain this has brought me"

Fourth circle: sexual health and reproduction. This involves biological factors of sexual anatomy and physiology, contraception, reproduction, and the sexual response cycle. Respondents described suffering that ranged from pain during erection and penetration to insufficient sensation to maintain arousal and achieve orgasm. One participant noted that due to the overwhelming sensory challenges from his circumcision, his lack of sensual experience interrupted the sexual response cycle. He described coping by:

> "Avoidance of sexual encounters to avoid worsening negative thoughts about myself and the fact that thanks to my mutilation it is basically just a hose for urine and not worth anything more"

Fifth circle: sexualization. This involves power and influence with regard to sexuality.

Respondents expressed feelings of violation and disempowerment by a circumcision imposed on them without their consent. Many expressed resentment about lack of control over such a powerful decision with lifelong impacts on sexual health, experience of their bodies, sense of masculinity and sexual identities, and relationships with partners. They directed anger at parents, doctors, society, culture, and religion. Respondents attributed feelings of anxiety and depression to circumcision.

> "I felt unwhole. Robbed. I was angry for years. I still am"

> "Considered removing penis to end pain and suffering"

> "I've had suicidal thoughts, anxiety, and depression, which I partly attribute to it and is now sometimes triggered by it"

Since a circumcised individual cannot participate in sexual activities involving foreskin manipulation "…these individuals must rely on a narrower range of physical acts that conform to the contours of their penis." [46] p5].

In varying and multifaceted ways, experiences of circumcised respondents *are* sexual because they expand concepts of human sexuality beyond physiological response, anatomical and neurological function, injury, and the sexual response cycle, allowing for an expanded examination of sexual implications of circumcision.

We agree that "…even the smallest prevalence of these severe complications is significant given that the procedure in question is by definition medically unnecessary" [17] p6], and especially given the exceedingly high incidence of neonatal circumcisions performed each year in the US and globally.

Sources of first awareness of harm (Q15). Common sources of awareness of harm included: wife, girlfriend, sex with intact men, researching circumcision for newborn son, and variations on "I simply googled uncircumcision at age 12." The intactivist movement (i.e., political activities and resources dedicated to opposing/ending medically unnecessary childhood genital operations) was not a major source of awareness of harm (8.16%). Rather, for those who engage(d) in it, activism is/was a vehicle for validating, expressing and healing the distress that was present from an early age.

Lasting circumcision trauma: suffering, grief, and suicide. Our survey responses suggest that circumcision is a cause of male body-loss grief. As suggested by others, the traumatic effects of foreskin loss can last a lifetime [47] p751, [48], and circumcision may be properly understood as an Adverse Childhood Experience [49]. Suicide and suicidal ideation related to circumcision grief is increasingly being discussed by men and reported in the media [50–53].

One researcher found among his interviewees that repeatedly observing effects of their circumcision when bathing, urinating or during sexual activity often stirred symptoms of post-traumatic stress disorder. He concluded:

"The process of grieving for a lost foreskin closely parallels the experiences of those who have suffered amputation, rape, body dysmorphic disorder" [54] back cover].

Follow-up research evaluating 22 men seeking therapy for circumcision grief found:

Therapists were reluctant to accept that the grief was real, were unaware of foreskin functions, denied circumcision had physical or psychological sequelae and minimized patient grief …[55] p109].

As one author observed about FGC "For the majority of girls and women, the psychological effects are more likely to be subtle, buried beneath layers of denial, mixed with resignation and acceptance of social norms" [56]. The same may reasonably be true for the majority of circumcised boys and men in high-prevalence societies where questioning of the norm is socially discouraged.

Our findings echo another review of neonatally circumcised males that "revealed a 'discovery' theme, previously noted as well within the literatures on intersex and (endosex) female genital operations" [17] p6] wherein those affected become aware, later in life, of adverse physical and psychosexual phenomena associated with having their genitals surgically altered as children without medical indication or their consent.

Research question 2. What were/are their restoration experiences and results?

Restorers reported diverse goals, reflecting various motivations for starting restoration. For some tightly circumcised respondents it was sufficient to achieve enough slack skin for more comfortable erections and masturbatory experiences.

For those whose chief complaint was a dry, keratinized or desensitized glans, or who suffered constant discomfort from the exposed glans rubbing on clothing, partial or total glans coverage while flaccid was a reasonable goal.

Others whose unprotected meatus (urinary opening) was persistently irritated from the friction of clothing may have sought greater glans coverage (with overhang) to prevent such irritation.

For still others, attaining the maximum amount of gliding action for comfortable penetration and reduced friction during intercourse could explain their goal of total glans coverage (plus overhang) when erect.

Regardless of coverage goals (Supplemental Table S5), restoration was commonly associated in this sample with one or more benefits including: increased moisturization and re-sensitization of the glans, increased sensory input and sensual pleasure relating to the interactive gliding motion of the pseudo/ersatz foreskin, improved self-image by appearing to be intact, psychological and self-esteem benefits from having reclaimed their bodies, and improved sexual and/or intimate relationships.

Most respondents reported that their negative feelings were somewhat eased or eliminated completely by restoration. Those who had identified prior negative coping behaviors stated that such behaviors were decreased or, in some cases, eliminated entirely.

Most restorers committed significant time, effort, and money to regain their bodily integrity, especially absent any professional monitoring or support (Supplement Section "Personal Experience"). Some (18.83%) had abandoned restoration due to difficulty and frustration with the process, with over half of those spending less than one year attempting to restore.

At time of survey, >75% were continuing restoration either on a consistent or intermittent basis, while 5% of participants said they had met their goals and satisfactorily completed their restoration. Reported duration of time spent restoring ranged from less than one year to over five years. One respondent uploaded a pre-restoration photo and final photos of his 16-year restoration journey with self-captioned commentary about the positive effects restoration had on his marital relationship (Fig. 3). While pride in one's restoration was not a survey question, his testimonial, among many others, exemplifies how restorers in this sample often felt more confident in their bodies.

Research question 3. What were restorers' experiences with medical/mental health professionals, or why didn't they reach out?

86.76% of the respondents did not consult any professional (Q41) because in the words of one participant:

"…male genital mutilation isn't taken seriously"

Of those who sought restoration help from a medical or mental health professional, 25% reported that those professionals trivialized or dismissed their concerns or reacted with ridicule. Fairly typical participant responses included:

"Brought it up with doctor once but they were unsupportive"

"Asked primary once. Unhelpful and felt like they were laughing at me for it."

Ignorance of circumcision suffering is exemplified by this physician who remarked: "I have never seen an adult with PTSD from a neonatal circumcision. Nobody has ever told me that they regret a circumcision." [57] para26]. Beyond ignorance, many professionals are simply unprepared to deal with circumcision sufferers and foreskin restorers, which reinforces mistrust among these patients, as captured in these comments:

"In many cases I find that I know more than most 'professionals'"

"Medical doctor caused it. I didn't trust them to discuss reversing. Still don't."

Lack of understanding and support for MGC sufferers and foreskin restorers among professionals and the general public is viewed by some as a reflection of *circumcisionism*: "the hegemonic view that genital circumcision is a normative and acceptable practice" [58, 59] & Box 3] as well as holding false beliefs about unaltered genitalia and the consequences of childhood genital modification [1].

Overall, restorers believe that the professional community is insufficiently educated about concerns of MGC sufferers and are ill-prepared to offer foreskin restorers the understanding and assistance needed to support them on their restoration journey [60]. This could explain why the restoration community remains rather isolated from medical and mental health professionals.

Do participants recommend foreskin restoration? As noted earlier, while pride in one's restoration was not a survey question, many respondents seemed to feel more confident in their bodies, which may be why most respondents (86.7%) said they would recommend foreskin restoration to others (Q48) (Supplemental Table S6).

Among reasons for selecting "yes" in response to the recommendation question:

"It gives you a sense of taking back some control of your body"

"If circumcision bothers you and you can do something about it, why not do it?"

"It's the only option besides surgery, suicide, or giving up and suffering through life"

"Restoration works. It is both physically and emotionally healing"

Some reasons for responding "no":

"Takes too long"

Fig. 3 One respondent's restoration. Top: Pre-restoration (2004) Bottom: Post-restoration (2020).

"It doesn't work. Circumcision should be outlawed as a barbaric practise"

"Severed nerve endings are irreplaceable."

Among reasons for selecting "unsure":

"While I don't doubt it works for some, I'm unsure since it didn't work for me"

"It's a long slow process which can get depressing when results aren't seen regularly. Methods and devices are bulky and hard to use comfortably in day to day work"

Box 3. How is circumcisionism manifested?

(for corresponding references see Unabridged Supplement)

A review of academic literature and intactivist websites reveals what some genital autonomy advocates believe to be examples of circumcisionism:

- Calling unmodified genitals, or the entire person, "uncircumcised" (rather than intact), implies "that circumcised is the default state of human males (question: is unmastectomied the universally accepted default state of human females?)" [182];
- Scientifically supported information about foreskin anatomy and functions is easily accessible online [135,183–185], yet most US medical textbooks depict the penis as circumcised by default and do not discuss preputial anatomy or physiology [186];
- Physicians routinely misdiagnose the naturally adherent prepuce in young boys as "pathological phimosis" to justify needless insurance-paid circumcisions [79,83];
- Aggressive marketing of newborn circumcision in US hospitals, where 94% of mothers are solicited for circumcision and the average number of in-hospital solicitations is eight [187], has prompted a consumer protection initiative "Don't Ask. Don't Sell®." [9] (in Abridged) & 24 (in Unabridged Supplement)];
- Newborn circumcision is financially profitable for physicians, hospitals, device manufacturers, insurance providers and others [188];
- Circumcision advocates consider the intact newborn foreskin to be of no value (or a potential health hazard), yet after excision the tissue gains immense value to commercial bio-tissue and cosmetic firms [4] p123, 189];
- Many US physicians ignore proven cost-effective non-surgical prophylaxis and treatment methods that preserve bodily integrity [84];
- Personal biases heavily influence circumcised male physicians and female physicians with circumcised sons [190];
- The AAP–among the only professional medical bodies in the world to defend and promote newborn circumcision–was internationally criticized for medical ignorance over its "culturally biased" 2012 circumcision policy statement [191];
- An AAP Circumcision Task Force member publicly repeated that "no one knows the function of the foreskin" before invoking his and his wife's personal predilections for the circumcised penis [192];
- Ethical and human rights concerns regarding genital cutting of newborn males are routinely disregarded [193–197];
- Seeking breast reconstruction after medically necessary, consentual mastectomy is considered reasonable, yet seeking foreskin restoration after *medically unnecessary, non-consentual* circumcision is often ridiculed [198].

Participants were generally enthusiastic about what they accomplished with restoration and are willing to offer encouragement and support to others.

Survey limitations

As one of the first empirical studies exploring the attitudes, motivations, and experiences of foreskin restorers, we used targeted sampling to reach this distinctive population and did not survey non-restoring circumcised people (as a potential comparison group).

Because only descriptive data is gathered and reported, no correlational conclusions or causal inferences are drawn. We did not measure psychological (e.g., trauma-related) responses through standardized instruments and relied solely on participant self-responses (i.e., as an initial means) to explore qualitative experiences, self-understandings and interpretations, and personal meaning-making frameworks and narratives in relation to long-term phenomena associated with circumcision, along with motivations for uncircumcision. Future research could explore outcomes using a longitudinal study pre- and post-restoration and could incorporate psychometrically validated, quantitatively-based self-report measures.

A limitation to generalizability is that it was not possible to randomly sample from the total population of foreskin restorers; rather, our sample was recruited primarily through online forums and anonymous contacts of individuals who had purchased restoration devices.

Because we did not conduct a systematic qualitative analysis of open-ended responses, comments we selected are meant to highlight quantitative data, but should not be interpreted as being representative of all response data.

Reframing circumcision

Complex experiential harms reported by respondents suggest that the current debate over "benefits vs. risks" of circumcision (i.e., third-party utility calculations based on probabilistic/anticipatory health benefits vs. estimated risk of surgical complications) is insufficient to determine whether circumcision will be helpful or harmful to any specific child and the adult they become. Surgical complications are not the only harms. Future discussions about newborn/childhood circumcision should be expanded to account for the full range of lived experiences of persons who have come to face what is, to them, a troubling realization: namely, that a healthy, normal, sensitive part of their penis was removed without their consent and without medical necessity. Therefore, a more productive formula might be "potential advantages vs. inherent disadvantages" of circumcision.

The very existence of a global foreskin restoration community amplifies the question of who should be allowed to authorize such childhood surgery: the person whose penis it is, or their parents/guardians. According to the American Academy of Pediatrics Bioethics Committee, physicians, at a minimum, "have legal and ethical duties to their child patients to render competent medical care based on what the *patient needs*, not what *someone else expresses*" [61], emphasis added]. This suggests that, regardless of parental expressions of a preference to have their child genitally modified, doctors behave unethically–and potentially illegally–if/when they perform a genital surgery on a child patient who does not, in fact, need it.

According to the World Health Organization (WHO), among numerous other supranational medical and legal bodies, all human beings, including children, have a fundamental right to bodily integrity. The WHO affirms that this right is violated, in the case of FGC, by *any* medically unnecessary genital cutting, regardless of motivation or how superficial (i.e., even if not physically harmful). Since the right in question is a human right, the same conclusion must apply to MGC. Consistent with this, it is increasingly acknowledged by ethicists and legal scholars that non-therapeutic infant penile circumcision violates the rights of the child [32] and Supplementary references 156, 160, 191, 195, 196, 203–207].

CONCLUSION

Foreskin restorers constitute an under-recognized and understudied, yet not insignificant, population of patients who systematically seek to undo the surgeon's work. Our survey results provide insights into lives of these individuals, most of whom identify as men, along with a small percentage who identify as intersex persons or transgender women. Collectively, participants reported suffering numerous physical, sexual, emotional, and relational injuries associated with their circumcisions. Most did not feel comfortable speaking up about their difficulties outside of a small number of trusted individuals, if any, and the minority who sought medical or professional help were unlikely to receive informed, sympathetic care. Such reticence is reinforced by experiences of marginalization and/or well-founded fears of being misunderstood, unsupported, not being taken seriously, or worse, being ridiculed by family, friends, or the very health professionals from whom one should be able to expect compassionate assistance.

Our findings offer insights into how foreskin restorers have been ill-served by medical and mental health professionals. Accordingly, in the Unabridged Supplement to this paper (Section

"Recommendations"), we propose detailed recommendations for future research to better understand the long-term adverse effects of non-voluntary, non-therapeutic genital cutting upon those assigned male at birth, along with indirect effects on their partners; to ascertain the various ways in which these effects manifest themselves; to improve medical education; to improve professional services to circumcision sufferers and foreskin restorers; and to better inform parents about potential adverse impacts of childhood MGC, all with a view to ultimately reduce its incidence to the point that non-therapeutic newborn male circumcision is no longer considered to be within the standard of care by physicians and hospitals.

DATA AVAILABILITY

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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ACKNOWLEDGEMENTS

TH wishes to acknowledge the late R. Wayne Griffiths, who guided TH on his own restoration journey, assisted him with the co-founding of the National Organization of Restoring Men (NORM), conducted the first organized survey of 240 foreskin restorers in 1995, and whose early efforts inspired TH to undertake this current larger-scale survey. The authors also express their gratitude to the more than 2100 respondents who courageously stepped forward to share their lived experiences on this intensely private matter by submitting completed or partially completed surveys.

AUTHOR CONTRIBUTIONS

This investigation was conceived by TH who developed the survey questionnaire based on decades of listening to the lived experiences of circumcision sufferers and foreskin restorers. He assembled and managed the team of co-authors and contributed significantly to the overall manuscript. LS acted as Principal Investigator, obtained IRB approval from Quinnipiac University, authored the Methods and Result sections, and contributed significantly to the Discussion section. WJ, as statistician, contributed his skills to analyze survey findings, and along with LS authored the Methods and Results sections. RM contributed conceptual knowledge and data analysis and organized the overall presentation flow. BS, as a certified sex therapist, authored the Discussion section relative to sexual impacts. MAB as a physician and author of medical textbooks on male genitalia and the complications of circumcision, provided medical review of the section on penile anatomy, physiology, and circumcision complications. All authors were responsible for the review and editing of the final manuscript prior to submission.

COMPETING INTERESTS

TH is the author of two related surveys of circumcision sufferers and is co-founder of the nonprofit charity the National Organization of Restoring Men. TH knew the owners of two restoration device companies and asked for assistance to promote this survey to past customers. Anonymized email lists were supplied to TH at no charge and no promotional promises were made to the companies. LMS has written numerous articles about ethical and human rights implications of circumcision; WAJ has performed statistical analyses and published papers about circumcision; RM appeared in documentaries and videos and has written about the ethics and effects of circumcision; BS appeared in a circumcision documentary for US parents; MABF has published medical textbooks on normal and abnormal prepuce and the short- and long-term physical effects of penile circumcision. The non-profit organization Doctors Opposing Circumcision underwrote the subscription cost (<$300) of the online survey software used in this research.

ETHICAL APPROVAL

This study received Institutional Review Board approval (Protocol #04421) from Quinnipiac University in Hamden, CT, USA, and followed all ethical standards to ensure proper protection of participants and their data.

ADDITIONAL INFORMATION

Supplementary information The online version contains supplementary material available at https://doi.org/10.1038/s41443-023-00686-5.

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