Unabridged Supplement to

Foreskin Restorers:

Insights into Motivations, Successes, Challenges and Experiences with Medical and Mental Health Professionals

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Abstract

This is the Unabridged Supplement to an article by Hammond, et al. published in the *International Journal of Impotence Research*, entitled "Foreskin Restorers: Insights into Motivations, Successes, Challenges and Experiences with Medical and Mental Health Professionals: An Abridged Summary of Key Findings" (2023). Here we include a more detailed Methods section along with extended and supplementary findings, with additional Figures and Tables (titles highlighted in yellow) not available in the Abridged Summary. We also provide additional background research, historical context, theoretical material, and analysis to aid interpretation of findings, as well as educational and harm reduction recommendations. Some material is overlapping between the two documents. The reported findings are the result of an in-depth survey consisting of 49 qualitative and 10 demographic questions, administered to the largest-ever sample of foreskin restorers to date. It explores their motivations, outcomes, and experiences with professionals. Over 2100 surveys were submitted by participants from 60 countries. We report results from 1790 fully completed surveys. Please note that some of the Tables and Figures herein do not follow in numerical sequence as they are **unique** to this Unabridged Supplement and they are positioned within the text where they are most relevant. They are preceded by the letter S (e.g., Table S5) and their titles and descriptions are highlighted in yellow for ease of identification.

Keywords: male circumcision, prepuce, foreskin restoration, genital mutilation, genital autonomy, sexual health, psychology, medical ethics, adverse childhood experiences, post traumatic stress disorder.

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.

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.

1. 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, serving various different purposes, including socio-functional (e.g., age-group bonding, maintenance of intergenerational hierarchies), religious/mythological, gender-normalizing, and (other) practical and symbolic purposes [1, 2 pp57 & 101]. In many communities, one of the aims or expectations of the cutting, in either sex, has been that it would dampen sexual sensations or urges culturally perceived to be excessive [3, 4 p105]. Today, many adults affected by childhood genital cutting continue to report adverse sexual outcomes, although contemporary proponents of the practices, who no longer seeing sexual diminution as desirable or defensible, tend to dismiss such testimony.

In recent times, these 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 and 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” [5]. 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. Accordingly, MGC is estimated to be approximately 6 times more prevalent than FGC globally [6].

MGC is not limited to foreskin ablation (i.e., circumcision), but takes many forms, ranging from foreskin slitting to urethral insertions to subincision to full castration [7].

A typology for MGC has been proposed [8] to complement the World Health Organization (WHO) typology for FGC, but it has not yet been recognized. In this research, we focus on the most common form of MGC, penile circumcision (partial or total removal of the penile prepuce or foreskin; see Box 1). We are particularly interested in understanding the experiences of persons who were circumcised in early childhood, including shortly after birth, and who have since been motivated to embark on a journey of attempted non-surgical foreskin restoration.

1.1. The Long Historical Search for Wholeness

The historical record of preputial reconstruction (pre-20th century) is sparse but starts with mention around the late 2nd century BC of Jewish males who "made themselves uncircumcised and forsook the holy covenant" [9]. Epispasm (επισπασμοσ: circumcision reversal) was developed in the Hellenistic period [10] for those who were circumcised, or those born with deficient or no prepuce (*aposthia*), and who sought to cover their bared glans to gain social respectability in Greek society [4 p31]. Celsus (25BC-50AD) described a decircumcision operation [11, 12]. Anecdotes exist about some circumcised Jews and Gentiles during World War II seeking to remedy their condition with quick, crude and potentially life-saving restoration surgeries [13, 14].

In 1934 *Sexology* magazine featured readers debating circumcision, and in 1950 published inquiries from circumcised men seeking to regain their genital integrity [15], with similar inquiries in men's magazines throughout subsequent decades [16, 17].

Surgical attempts at foreskin restoration occurred from the 1960s to 1990s [18-20]. Subsequently "There has been no study that has systematically evaluated the efficacy of any reconstructive procedures" [21].

1.2 How Common is Foreskin Restoration Today?

The estimated US annual incidence of in-hospital newborn circumcision is 1.2 to 1.3 million [22, 23], with religious ceremonies and private clinics likely increasing the incidence to 1.5 million [24]. 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 60000 to 75000 active or potential/willing foreskin restorers currently in the US. Prospectively, based on the same assumption, 12000 to 15000 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 [25].

Previously, quantitative estimates of the reported/observed harms and disadvantages of circumcision relied heavily on non-targeted surveys, which are likely to be ineffective in

accessing the affected subset of circumcision sufferers who are actively engaged in foreskin restoration and exploring their subjective experiences [26].

Some rare surveys have, however, explored the antecedents of circumcision distress and motivations for foreskin restoration in relatively small samples of respondents. [6, 27-31].

1.3. A Solution in Search of a Problem

Questioning the US practice of near-universal newborn circumcision increased after the 1980 publication of Edward Wallerstein's 'Circumcision: An American Health Fallacy' in which he called circumcision "a solution in search of a problem" [32 p197]. Wallerstein asserted that "the surgical removal of a possible infection site is not a solution" (p87) and that a less anachronistic and more rational prophylaxis for poor genital hygiene, where relevant, is providing proper knowledge and necessary sanitary facilities. Wallerstein's arguments were presented to a nationwide US television audience in a 1981 interview ending with his strong indictment of the medical community's defense that circumcision is a parental decision, which he called "a cop out" [33].

Wallerstein's book was followed by others that provided parents with information about circumcision and foreskin anatomy and function that they weren't receiving from medical professionals [34-39; see also Box 1].

Concurrently, some circumcised men began exploring reparative options. Books were published exploring the process of surgical and non-surgical restoration [40-42]. In 1987, a popular national talk show featured a man extolling his surgical restoration [43], after which another surgically restored man went public with his story [44].

Absent any medical support for foreskin restoration, and sometimes facing outright derision from medical professionals, the National Organization of Restoring Men was formed in 1989 to offer men technical and moral support to remedy their unwanted circumcision [45].

The concept quickly spread nationally and internationally [46-51]. In 1992 'The Joy of Uncircumcising!' was published, a quintessential guide to foreskin restoration, the first three chapters of which emphasized 'Men's Voices' and recounted their circumcision harm and elation with restoration efforts [52]. 'Joy' garnered media attention [53, 54] and from then onward general circulation newspapers and magazines featured men engaged in restoration [55-67].

In 1995 the first ever 'circumcision documentary' (Whose Body, Whose Rights?) highlighted men discussing their circumcision harm and restoration efforts [68], followed by two documentaries from Jewish filmmakers [69, 70], a Netflix exposé [71], and a thoughtful parenting film featuring circumcision sufferers [72].

Another 'first' occurred with the book 'Unspeakable Mutilations', published in 2014, dedicated to compiling the lived experiences from scores of circumcision sufferers [73]; followed by a painful memoir of one circumcised man's excruciating emotional journey [74]; followed by yet another 'first', a highly controversial stage production that raised free speech issues involving one Jewish man angrily recounting his circumcision harm [75].

Box 1. Foreskin: Form Follows Function

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].

Historic legal victories by circumcised men against their circumcisers occurred in 2003 [94] and two successful cases of men whose foreskin restoration costs were reimbursed [95, 96].

1.4. Foreskin Restoration: The Modern Process and Promise

Diverse aspects of foreskin restoration are covered elsewhere [97] but the essential method of non-surgical foreskin restoration borrows from the well-accepted medical process of tissue expansion that places gentle tension over time to encourage new growth and involves expanding remaining penile shaft skin forward over the glans.

> [T]here is *no* fast or instant restoration. One must work into his daily habits a regimen that will suit his lifestyle and work habits. Keeping the glans covered and protected from rubbing against clothing will help to retain the sub-preputial fluids, where they will start the process of de-keratinization (sloughing off of the layers of calloused tissue) [28 pp193-194].

Contemporary non-surgical foreskin restoration employs gentle skin expansion to regrow remaining penile shaft skin forward over the glans using homemade and/or commercial devices [98, 99]. The most popular commercial devices include a stainless steel weight that affixes to penile shaft skin, allowing gravity to create tension, and another consists of a conical device covering the glans and securing penile shaft skin between silicone components (Fig. 1a-d). Manufacturers typically advise users to seek guidance from a medical professional.

Figure 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

1.5. Prior Research on Restoration Motivations and Results

There is scant scientific inquiry to understand motivations behind foreskin restoration, but one anecdotal motivation is to restore lost sexual sensitivity. One university study's findings "suggest minimal long-term implications for penile sensitivity [as] a result [of] neonatal circumcision" [100].

That study has been criticized on methodological grounds (including for being statistically underpowered) and its main conclusion rejected by at least one researcher who claims to treat premature ejaculation with circumcision specifically because "Circumcision radically desensitizes the penis" [101]. One critic admonished "The relationship between 'objective' measures of penile sensation and function and 'subjective' sexual experience is more complicated than studies of this kind can show" [102].

Since circumcised men have no foreskin "(T)he only form of stimulation comes in the form of pressure on the head and the shaft of the penis" [103]. The few sensitivity studies done so far made only static measurements at specific penile locations–often ignoring sensitivity on the mucosal surface of the inner foreskin–thereby not accounting for the subjective sensation of the foreskin 'in action'.

> Therefore, it is the dynamic movement of the foreskin, along with its particular interactions with the penile glans and shaft–across a range of receptive or interactive tissue environments–that would be most relevant to assessing the practical significance of this genital structure to sexual sensation and satisfaction [102 p3].

A distinct subset of the male population has been identified that experiences distress over their circumcised condition [104], acknowledging that some may seek foreskin restoration, yet the authors failed to investigate antecedents of such distress that had been previously identified [6, 27, 29, 30, 105]. The few inquiries into restoration seekers either pathologized restorers [106], focused on a single case study [107], or were limited by small sample size [31].

One possible explanation for distress among circumcised sufferers, and the relative importance of self-reported happiness with one's circumcised condition, is the role of choice [7, 108, 109]. Intact men can rectify penile dissatisfaction by choosing circumcision. Circumcised men have fewer choices to reverse their condition because available options are "timely, labor-intensive, and never truly 'restorative' (because the nerve fibers lost to circumcision cannot be re-grown)" [104 p777].

Our survey attempted to re-visit and re-examine the motivations, results and trends identified by these earlier investigations. We sought out individuals who are/were foreskin restorers to learn more about their concerns.

2. 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.

Our survey was designed to qualitatively explore the various reasons leading men to restore, and their experiences and communications with non-professionals and those in the healthcare field. Our goal was to systematically gather and analyze data from this subpopulation to demonstrate connections between participants' circumcised condition, their restoration goals, and their lived experiences.

We acknowledge that most circumcised men may not feel harmed in any way. We focus explicitly on the subpopulation of men–un(der)studied for decades–who indeed feel harmed by circumcision and were/are active foreskin restorers to better understand their specific concerns.

To reach this geographically dispersed, distinctive population, we therefore employed targeted sampling methods. As such, our results cannot be generalized beyond the sample obtained (e.g., to all foreskin restorers or to circumcised men 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).

2.1. Participants

1790 fully completed and 331 partially completed surveys were received from respondents in 60 nations. We report only results from the fully completed surveys.

Age range of participants (Q50) was: 18-19 years (*n*=39, 2.18%), 20-29 (*n*=370, 20.18%), 30-39 (*n*=480, 26.82%), 40-49 (*n*=292, 16.31%), 50-59 (*n*=288, 16.09%), and 60+ years (*n*=321, 17.93%).

The reported birthplace of most respondents (Q51) was: 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%), and France (*n*=26, 1.45%). Remaining participants were born in countries each of which represented <1% of total responses (*n*=171, 9.63%) and were collapsed into one category that included nations or regions where MGC is endemic (i.e., Israel and the Middle East, the Philippines, South Korea and Turkey).

A majority indicated their current residence (Q53) as: the United States (*n*=1287, 71.90%), Canada (*n*=119, 6.65%), the United Kingdom (*n*=101, 5.64%), Australia (*n*=72, 4.02%), Germany (*n*=39, 2.18%), and France (*n*=32, 1.79%). Remaining respondents were living in countries each representing <1% of total responses that were collapsed into one category (*n*=139, 7.88%). Respondents from the US and Canada also indicated state/province of birth (Q52) and of current residence (Q54) (supplemental data available on request).

Respondents reported parental religious affiliation (Q55) as: Christian (*n*=1322, 73.85%), Agnostic/Atheist (*n*=153, 8.55%), and None (*n*=138, 7.71%). Other categories comprising >1% of the sample included Jewish (*n*=82, 4.58%), Muslim (*n*=58, 3.24%), Mixed (*n*=58, 3.24%), Unknown (*n*=29, 1.62%), and Unstated (*n*=22, 1.23%). Remaining religious categories each of which accounted for <1% of the total responses and were collapsed into one category (*n*=158, 8.83%). Individual responses in the 'Other' category were re-coded and placed into already existing categories where appropriate.

Participants indicated current religious affiliation (Q56) as: Agnostic/Atheist (*n*=512, 28.60%), Christian (*n*=502, 28.04%), and None (*n*=482, 26.93%). Remaining religious categories with >1% of the sample included Buddhist (*n*=35, 1.96%), Muslim (*n*=22, 1.23%), Unknown (*n*=39, 2.18%), and Unstated (*n*=54, 3.02%). Remaining respondents reported religious affiliations each of which represented <1% of total responses and were collapsed into one category (*n*=142, 7.93%), which included Jewish (*n*=11, 0.61%). Within the 'Other' category, individual responses were re-coded and placed into already existing categories where appropriate.

Participants' reported highest level of education (Q59) as: primary school/non-high school graduate (*n*=32, 1.79%), completed secondary/high school (*n*=135, 7.54%), college, university or trade school without completion (*n*=324, 18.1%); completed college, university or trade school with a degree (*n*=854, 47.71%); and postgraduate (*n*=445, 24.86%).

Respondents identified their race/ethnicity (with a 'select all that apply' option) as: White, Hispanic/Latino (*n*=484, 27.04%); White, non-Hispanic/non-Latino (*n*=1174, 65.59%); Black or African American (*n*=36, 2.01%); Native Hawaiian or Pacific Islander (*n*=10, 0.56%); Indigenous/Native American/First Nations (*n*=40, 2.23%); Asian/South Asian (*n*=79, 4.41%); More than one race not identified above (*n*=41, 2.29%); Unstated (*n*=49, 2.74%).

Regarding sexual orientation (Q58), respondents identified themselves as: Straight/Heterosexual (*n*=839, 46.87%); Gay/Homosexual (*n*=589, 32.91%); Bisexual or Pansexual (*n*=350, 19.55%); Transgender (*n*=27, 1.51%); Intersex (*n*=3, 0.17%); Non-Binary/Fluid (*n*=75, 4.19%); Queer (*n*=60, 3.35%), Questioning (*n*=44, 2.46%); Asexual (*n*=34, 1.90%); Unstated (*n*=50, 2.79%); Other (*n*=3, 0.17%). Responses in the 'Other' category were appropriately re-coded to already-existing categories if there were duplicate responses.

2.2. Survey Construction

An online survey tool was developed containing 49 qualitative questions designed to measure motivations, successes, and challenges surrounding participants' restoration, and information about experiences with healthcare professionals. The survey also contained 10 demographic questions.

Questions were generated from those 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. The survey also included an opportunity to upload up to five restoration progress photos and participants were advised that by doing so they consented to the possibility that such photos may be used in published survey findings.

The survey's physical consequences section contained an image of intact penile anatomical structures (e.g., glans, meatus, foreskin, frenulum). In order to help respondents identify common circumcision outcomes, and because some might not understand specific terms (e.g., scar, skin bridge, meatal stenosis, etc), terms were linked to relevant photos of iatrogenic outcomes (Fig. 2a-e). To help estimate the severity of their circumcision and how much penile coverage participants had pre-restoration, as well as helping to define their coverage goal, respondents were directed to the Coverage Index chart [110].

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* (Supplemental 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.

	**a) Frenulum** Left: Intact (preservable during adult circumcision) Right: Ablated (near universal during infant circumcision).
	**b) Glans penis** Left: Moist, smooth surface (protected by foreskin). Right: Dry, keratinized surface (unprotected after circumcision).
	**c) Meatal stenosis** Left: Intact Right: Circumcised (Due to meatal irritation by outer environment when developing penis loses protective foreskin post-circumcision at a young age).
	**d) Tissue damage** Left: Tight erection (no skin mobility, often painful). Right: Prominent scarring.
	**e) Other anomalies** Left: Pigmentation variation. Center: Skin bridge. Right: Device injury to glans.

Figure 2. Types of Circumcision Damage

2.3. Survey Distribution

The survey, in English, Spanish, German and French, was launched June 22, 2021 and remained open for 100 days. Anonymity was assured by not collecting/storing any personal identifiers (e.g., name, email address). To reach our target population, invitations were emailed to 44000 customers of the two most popular commercial restoration devices. Announcements were sent to foreskin restoration Reddit forums, restoration device manufacturers and genital autonomy organizations. To reduce risk of duplicate responses, the survey software limited respondents to one IP address per device.

2.4. Survey Questions

Questions were grouped into three research inquiries to help us understand impacts of circumcision and restoration. These inquiries are utilized throughout this article to report data and discuss results. Survey participants were invited to upload up to five photos of their restoration progress (Q60), with 10% of respondents availing themselves of this opportunity. We include some of those images in this article.

2.5. Research Question 1: What Motivates People to Seek/Pursue Foreskin Restoration?

2.5.1. Precursors to Motivations

To assess motivations for restoration, participants were first asked at what age they were circumcised (Q2), and if they were circumcised more than once (Q3). If circumcised without their consent as a child, participants were asked if they experienced any sense of resentment over not having had a choice (Q6) or, if they were circumcised as an adult, if they regretted their decision (Q8).

Participants were also asked about the severity of their circumcision (Q9) using the Coverage Index Chart, and about adverse physical (Q10), sexual (Q11), emotional/psychological (Q12), and self-esteem (Q13) consequences they attribute to circumcision. Participants were then asked the age at first awareness of their circumcision damage (Q14) and the source of this first awareness (Q15).

2.5.2. Motivations

Participants were asked at what age they began restoration (Q16) and their motivation(s) for seeking it (Q17).

2.6. Research Question 2. What Were/Are Their Restoration Experiences and Results?

2.6.1. Personal Experience

Participants were asked about their restoration goal (Q18) and current restoration stage (Q19). If restoration was ongoing, participants were asked about duration (Q20) and estimated number of hours spent in the process (Q22). If restoration was abandoned, participants were asked duration (Q21), estimated number of hours spent on the process (Q23), and reason(s) for abandonment (Q24).

Participants were asked about: pre-restoration feelings (Q25), restoration's effect(s) on those feelings (Q26), prior coping behaviors for those feelings (Q27), restoration's effect(s) on those coping behaviors (Q28), changes in penile sensation (Q29), whether restoration caused any harm requiring medical attention (Q35), how much money they spent on restoration (Q36), and about potential interest in regenerative medicine for foreskin restoration (Q37).

2.6.2. Partner Experience

Participants were asked whether they were partnered during the restoration process (Q30) and, if so, the partner's attitude toward restoration (Q31). If partnered, they were asked about restoration's effect(s), if any, on the relationship (Q32) and how it had improved (Q33) or worsened (Q34).

2.7. Research Question 3. What Were Restorers' Experiences with Medical/Mental Health Professionals, or Why Didn't They Reach Out?

2.7.1. Communication with Others

Participants were asked about knowing other restorers (Q38), how they communicate with restorers (Q39), and which non-professionals they had spoken with (Q40).

To assess participants' communication with professionals, they were asked which professionals they spoke with (Q41) or why they hadn't spoken with any professionals (Q42). They were asked the gender of the professionals with whom they spoke (Q43) and the professionals' attitudes (Q44). They were asked to identify obstacles in speaking with professionals (Q45), whether they believed professionals need to be familiar with circumcision distress and foreskin restoration issues (Q46), and whether special training is needed for professionals working with foreskin restorers (Q47).

Respondents were also asked if they would recommend restoration to others (Q48) and to explain their response. Finally, participants were asked if they were willing to share personal testimony surrounding foreskin restoration (Q49).

3. Results[1]

3.1. Research Question 1. What Motivates People to Seek/Pursue Foreskin Restoration?

3.1.1. Precursors to motivations

The vast majority of participants were circumcised in the first month of life (Q2, *n*=1421, 79.39%) and most of them resented it (Q6, *n*=1501, 83.85%). The majority noted being circumcised once (Q3, *n*=1679, 93.8%). Some stated they were circumcised more than once (*n*=38, 2.12%), while others were unsure (*n*=73, 4.08%). Those who were circumcised by choice as an adult constituted about 6% of respondents (*n*=113). Of those, 80% (*n*=86) reported that they immediately regretted their decision and still do.

Using the Coverage Index chart, 37.93% of participants (Q9, *n*=679) reported a C-1 severe circumcision (e.g. no tissue mobility when erect, causing skin tightness and/or pain); 55.64% of participants (*n*=996) disclosed a C-2 to C-3 moderate circumcision (e.g. enough loose tissue when erect to only glide over the shaft but not the glans/head); and 6.42% (*n*=115) reported a minimal C-4 circumcision (e.g. enough loose tissue when erect to partially or completely pull over glans/head).

Participants were most likely to attribute dry, keratinized glans; partial/total loss of foreskin; and partial/total loss of frenulum as the most common types of physical damage (Q10, Table 1).

Top three categories of reported sexual damage (Q11, Table 1) were: insensitive glans (*n*=1122, 62.68%); excess stimulation needed to achieve orgasm (*n*=857, 47.88%); and delayed orgasm (e.g. 'I can't come when I want to') (*n*=503, 28.1%).

[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.

Regarding emotional or psychological damage (Q12, Table 1), participants were most likely to select frustration (*n*=1055, 58.94%); anger (*n*=918, 51.28%); dissatisfaction/distress (*n*=840, 46.93%); and human rights violation (*n*=821, 45.87%). When asked about self-esteem issues (Q13, Table 1), participants were most likely to report feeling less whole (*n*=1060, 59.22%); feeling inferior to those with intact foreskin (*n*=989, 55.25%); and feeling mutilated (*n*=887, 49.55%).

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 or 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	5.47%	embarrassment	30.50%	other	1.01%

		medication or devices)					
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%		

Participants were asked their age at first awareness of circumcision harm (Q14, Table 2) and source 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%). Top sources of first awareness were: stumbling across the topic (*n*=782, 43.69%); actively seeking out information (*n*=475, 26.54%); and a variety of other sources constituting 91.62% of all respondents.

Notably, only 8.38% (*n*=150) reported specific websites/blogs devoted to restoration or intactivism (i.e., political activities and resources dedicated to opposing/ending medically unnecessary childhood genital operations) as the source of their first awareness of circumcision harm.

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

3.1.2. Motivations

Participants reported the age when they began restoration (Q16) as: before age 18 (*n*=143, 7.99%); 18-19 (*n*=141, 7.88%); 20-29 (*n*=615, 34.36%); 30-39 (*n*=391, 21.84%); 40-49 (*n*=236, 13.18%); 50-59 (*n*=182, 10.17%); and after age 60 (*n*=82, 4.58%). One participant admitted starting restoration at a very young age:

"I started restoring in elementary school."

Participants reported their specific motivations for seeking restoration (Q17, Table 3) and were most likely to choose: to increase glans sensitivity (*n*=1429, 79.83%); to enhance sexual pleasure (*n*=1399, 78.16%); and to protect the glans (penile head) from the outer environment (*n*=1342, 74.97%).

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

3.2. Research Question 2. What Were/Are Their Restoration Experiences and Results?

3.2.1. Personal Experience

Table S5 offers a breakdown of participants' restoration goals. In terms of participants' restoration stage at time of survey (Q19), 91 respondents (5.08%) reported their restoration was complete; 618 respondents (34.53%) reported it was ongoing in a consistent/persistent manner; 744 respondents (41.56%) indicated it was ongoing intermittently; and 337 respondents (18.83%) indicated they abandoned restoration without meeting their goal. One participant submitted a photographic series documenting his progress from a CI-3 to CI-9+ over a five year period (Fig. S4).

Table S5. Restoration Goals of Foreskin Restorers (Q18)

Response Option	Response Percent	Response Count	Cumulative Percentage
enough slack skin to overcome skin tightness during masturbation	4.25%	76	100.00%
partial glans/head coverage when flaccid	9.33%	167	95.76%
complete glans/head coverage when flaccid	25.87%	463	86.43%
partial glans/head coverage when erect	16.09%	288	60.56%
complete glans/head coverage when erect	16.76%	300	44.47%
glans/head coverage with overhang when flaccid	14.25%	255	27.71%
glans/head coverage with overhang when erect	13.46%	241	13.46%

For participants whose restoration was ongoing, duration of restoration (Q20) was: ≤1 year (*n*=302, 20.79%); one to five years (*n*=593, 40.81%); ≥5 years (*n*=558, 38.40%). For number of hours spent on restoration (Q22): 537 (36.96%) reported <1000 hours; 638 (43.91%) 1000-10000 hours; 164 (11.28%) 10000-20000 hours; and 114 (7.85%) reported >20000 hours.

For participants who abandoned restoration, duration of restoration (Q21) was: ≤1 year (*n*=183, 54.3%); one to five years (*n*=123, 36.49%); ≥5 years (*n*=31, 9.2%). For number of hours spent on restoration before abandonment (Q23): 208 (61.72%) reported <1000 hours; 102 (30.27%) 1000-10000 hours; 19 (5.63%) 10000-20000 hours; and 8 (2.37%) reported >20000 hours. Participants who abandoned the process were also asked why (Q24), with top responses being: too much trouble/too difficult (*n*=134, 39.76%); did not reach desired result and/or gave up hope of meeting goal (*n*=82, 24.33%); and lost patience with the process (*n*=74, 21.96%).

Figure S4. One Survey Respondent's Five Year Progress from CI-3 to CI-9.5+

Participants were asked about pre-restoration feelings (Q25), with top responses being: dissatisfaction/distress (*n*=1172, 65.47%), depression (*n*=599, 33.46%), and hopelessness (*n*=562, 31.4%). When asked about extent to which restoration changed those initial feelings (Q26): 240 (18.71%) said the process did not help those feelings; 83 (6.47%) stated it increased those feelings; 860 (67.03%) reported it eased those feelings somewhat; and 100 (7.79%) stated that restoration eliminated those feelings.

When asked about prior coping behaviors for those feelings (Q27) participants cited smoking, alcohol/drug use, self-harm, compulsive eating or compulsive sexual behavior (defined as increased number/frequency of sexual encounters to compensate for poor quality sexual experiences). Participants were asked about restoration's effect(s) on those behaviors (Q28). Most participants (*n*=1197, 66.87%) reported having no prior coping behaviors. but the most prevalent coping behavior reported was sexual compulsivity (*n*=393, 21.96%), followed by alcohol use (*n*=187, 10.45%). As a result of restoring (Q28), slightly over half reported that those behaviors decreased (*n*=298, 51.38%) or were eliminated entirely (*n*=59, 10.17%); while 27 (4.66%) reported their coping behaviors increased or remained unchanged (*n*=196, 33.79%).

Participants were asked about changes in penile sensation from restoration (Q29). A total of 1237 (69.11%) reported increased pleasure, 15 (0.84%) decreased pleasure, 255 (14.25%) no change, and 283 (15.81%) were unsure.

Participants were asked if restoration caused any harm requiring medical attention (Q35): 95.31% (n=1706) reported no such issues (remainder reported minor skin abrasions discussed during regular physician visits).

Participants reported how much money they had spent on restoration (Q36) as: <$500 USD (*n*=1347, 75.25%); $500-$1000 USD (*n*=291, 16.26%); >$1000 USD (*n*=106, 5.92%); with remainder unstated.

Respondents were asked about interest in regenerative medicine for foreskin restoration (Q37). Significant progress in this realm has been made by Foregen [89]. Sixty seven percent (67%) of respondents were either somewhat interested (*n*=457, 25.53%) or very interested (*n*=737, 41.17%), especially if it were financially feasible (ca. $10000 USD).

3.2.2. Partner Experience

Participants were asked whether they were partnered during the restoration process (Q30). 996 (55.64%) reported being partnered with a significant person (e.g. married, civil union, domestic partnership, cohabiting or committed dating); 352 (19.66%) were unpartnered and sexually active; and 442 (24.69%) were unpartnered and not sexually active.

If partnered, respondents were asked about their partner's attitude toward restoration (Q31), which was reported as: 460 (46.18%) said partner was supportive; 453 (45.48%) indicated partner was neutral; and 83 (8.33%) stated partner was discouraging.

Participants were asked about restoration's effects on the relationship (Q32) with: 250 (25.10%) reporting it had improved their relationship; 59 (5.92%) said the relationship worsened; 640 (64.26%) indicated no effect; and 33 (3.31%) selected 'Other' (e.g., some had multiple partners who variously approved or disapproved, while others indicated they hid their restoration efforts from partners).

Among those for whom restoration had improved the relationship, participants were asked to explain how (Q33): 227 (93.8%) stated their relationship improved sexually; 178 (73.55%) said it improved emotionally; 86 (35.54%) reported it improved intellectually; and 63 (26.03%) reported their relationship improved spiritually.

Among those for whom restoration had worsened the relationship, they were asked to explain how (Q34): 24 (50%) stated relationship worsened sexually; 47 (97.92%) said it worsened emotionally; 15 (31.25%) reported it worsened intellectually; and 8 (16.67%) reported their relationship worsened spiritually.

3.3. Research Question 3. What Were Restorers' Experiences with Medical/Mental Health Professionals, or Why Didn't They Reach Out?

3.3.1. Communication with Others

Participants were asked about knowing other restorers (Q38): 578 (32.29%) said yes, and 1212 (67.71%) said no. Communication methods with others (Q39) involved: 59 (10.21%) personally (face-to-face); 338 (58.48%) virtually (via internet/telephone); and 181 (31.31%) both personally and virtually.

When asked which non-professionals they had spoken with (Q40) responses included: no one (*n*=544, 30.39%); a partner/significant other (*n*=889, 49.66%); friend(s) (*n*=737, 41.47%); family (*n*=313, 17.49%) and someone else (*n*=111, 6.20%).

When asked which professionals they had spoken with (Q41) responses included: no one (*n*=1553, 86.76%); medical professional (e.g. urologist, primary physician, plastic surgeon) (*n*=161, 8.99%); mental health professional (e.g. psychologist, psychiatrist) (*n*=80, 4.47%); sexologist/sex therapist (*n*=18, 1.01%); spiritual counselor (*n*=5, 0.28%), or someone else (*n*=7, 0.39%).

Reasons for not speaking with professionals (Q42) included: felt hopeless/didn't think professionals would be knowledgeable or supportive (*n*=901, 56.95%), embarrassment (*n*=617, 39%) or feared ridicule (*n*=483, 30.53%).

Gender of the professionals spoken with (Q43) was: 129 (62.02%) male; 41 (19.71%) female; and 37 (17.79%) more than one gender because participant visited more than one professional. Participants noted the professionals' attitudes (Q44, Table 4).

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

Participants were asked about obstacles to seeking professional help (Q45), with top responses being: professionals insufficiently aware/compassionate toward foreskin restorers (*n*=1252, 69.94%); professionals insufficiently aware/compassionate toward circumcision sufferers (*n*=1242, 69.39%); and professionals insufficiently educated/knowledgeable about foreskin anatomy/functions or the harms of circumcision (*n*=1153, 64.41%).

When asked if professionals need to be familiar with circumcision distress and foreskin restoration issues (Q46): 1658 (92.63%) responded affirmatively; 30 (1.68%) said no; and 102 (5.7%) were unsure. When asked if professionals need special training to work with foreskin restorers (Q47): 1483 (82.85%) responded yes; 61 (3.41%) responded no; and 246 (13.74%) were unsure. Respondents were asked if they would recommend restoration to others (Q48, Table S6).

Table S6. Foreskin Restoration Recommended? (Q48)

Response Option	Response Percent	Response Count
Yes	86.70%	1552
No	2.18%	39
Unsure	10.95%	196

Finally, participants reported their willingness to share personal testimony about foreskin restoration (Q49) as: very likely (*n*=277, 15.47%); somewhat likely (*n*=388, 21.68%); unsure (*n*=364, 20.34%); somewhat unlikely (*n*=245, 13.69%); very unlikely (*n*=516, 28.83%).

4. Discussion

4.1. Demographics

4.1.1. Nation of Birth and Residence

In questions Q51 and Q53 respectively, most participants selected the United States as their country of birth and current residence. This is unsurprising since the US has the highest rate of non-therapeutic, non-religious neonatal circumcision [111].

After the US, next highest responses for birth nation and current residence were: Canada, the United Kingdom, and Australia. This also is unsurprising since those nations, like the US, share a history of MGC that began during the anti-masturbation campaigns of the Victorian Era. Unlike the US, however, those nations experienced dramatic drops in newborn circumcision rates after they adopted national health plans that chose not to pay for medically unnecessary interventions.

4.1.2. Gay/Bisexual men

As in previous surveys [6, 29], participation by gay and bisexual men was significantly higher than their representation in the general population. We speculate that this could be due to gay and bisexual men having a better understanding of the issue of genital autonomy in relation to penile anatomy. As discussed in footnote 2 to the abridged summary of this research, although 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). This would enable opportunities to directly observe and/or feel any anatomical or physical/functional differences between the penis in its surgically modified versus unmodified state, and to do so, moreover, in the context of real-life (i.e., ecologically valid) sexual behaviors and interactions.

Such observations/experiences could include visually examining circumcision-related damage (scarring, tight shaft skin, skin bridges, keratinized glans, etc.) and/or noting unique biomechanical affordances of the intact penis with respect to sex play (e.g., docking, foreskin manipulations/stretching, foreskin ballooning, etc.). In addition, concerns around bodily autonomy may be of heightened significance for gay/bi men in relation to such matters as safeguarding one's right to be with romantic and sexual partners of one's own choosing, what is 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 [112].

Some US circumcision advocates promote infant circumcision by alleging that (American) women prefer circumcised penises– a preference that can manifest as a sexual fetish known as *acucullophilia* [113]–thereby inappropriately prioritizing the possible sexual tastes of a child's hypothetical future intimate partners over what the child himself might come to value [114]. This also presumes the boy will later identify as heterosexual when, realistically, men who have sex with men rate a strong preference for intact partners, irrespective of the rater's own circumcision status [115].

Gay/Bi respondents reported that awareness of adverse effects they experience from their unwanted circumcision is heightened during sexual activity with circumcised or intact partners, either of which can provoke stress over their own genital loss.

Negative self-esteem, sexual distress and other psychosexual/psychosocial problems affecting neonatally circumcised gay/bi men merits further research.

4.1.3. Transgender Women and Intersex Persons

A small proportion of our respondents identified as transgender women (*n*=26, 1.45%) or intersex (*n*=3, 0.17%). Non-binary people often experience feelings of victimization from childhood gender-normalizing genital surgery [116-119]. This can be compounded in cultures where non-therapeutic childhood penile circumcision is endemic, resulting in similar, if not greater, suffering than that experienced by those who may identify as cisgender male. The ample and neurologically significant penile prepuce [120] can be advantageous to some transgender women during vaginoplasty [121, 122], placing those with an ablated penile foreskin at a disadvantage, resulting in a neovagina with shorter depth. One particularly compelling testimony from a Pakistani refugee described the personal impact of childhood penile circumcision on transgender women as “a violation that you can’t cure” [123].

Adverse effects of non-therapeutic childhood penile circumcision on transgender respondents are revealed in these comments:

“I'm trans, I need that flesh…”

“So I don't have an even worse neovagina”

“My surgeon used the restored tissue to create a sensate clitoral hood”

“Yep, transgender woman restoring her dick, wild right?”

Foreskin restoration can be beneficial to some transgender women in helping to reach their goals for gender-affirming surgery.

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. Further research is warranted into this important but unstudied area involving non-heterosexual and non-binary gender experiences of circumcision harm, dissatisfaction, distress, and engagement with foreskin restoration.

4.1.4. Religious identification

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. 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 a lasting negative impact over time upon adult religious identity or allegiance.

4.2. Research Question 1. What Motivates People to Seek/Pursue Foreskin Restoration?

Survey results show that long-term wide-ranging circumcision complications motivated respondents to pursue foreskin restoration. However, we note that ‘complications’ do not exhaust the category of circumcision-related harms, whether intrinsic or contingent.

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" [124]. Another researcher notes "(E)ven for circumcisions that are 'properly' performed…practitioners must contend with the fact that the foreskin is not a discrete entity, like a finger or gallbladder, but rather a sheath of tissue wrapped around and integrated with the larger structure of which it is a part (i.e., the penis)" [125].

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

Despite numerous known immediate and short-term complications [126, 127], the American Academy of Pediatrics has twice acknowledged that the precise risk and full extent of complications are likely not known [128 p.390, 129 p.e772]. This situation of inadequate data is because complications are ill-defined, obstetric circumcisers rarely do patient follow-up, many complications become evident only as the penis matures, and there is no comprehensive record-keeping of complications.

> Some authors have reported a complication rate as low as 0.06 per cent, …at the other extreme rates of up to 55 per cent have been quoted, …[t]his reflects the differing and varying diagnostic criteria employed; a realistic figure is 2-10 per cent [130].

A systematic review concluded that neonatal male circumcision complications are likely more common than is usually supposed [131]. An analysis of medicalized circumcisions found a complication rate of 4% and that adult complications are *not* greater than infant complications [132]. Even if serious complications are statistically rare, with over 1.2 million newborn circumcisions performed annually in the US [22], a 0.06% to 4% complication rate means 7200 to 48000 males per year (i.e., 360000 to 2.4 million males over the past 50 years) who may suffer serious physical and/or sexual complications that may also cause psychological distress or grief. While the true incidence of physical complications remains elusive, they are likely to be more common than imagined (e.g., due to the fact that talking about/reporting on perceived damage to one's penis is socially costly, making it not a regular topic of public discussion/awareness), and even greater when accounting for sexual, emotional, self-esteem or psychological complications.

Box 2. Tissue Loss from Circumcision

In a cadaver study, the mean surface area of the prepuce when unfolded was 46.7cm^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.

Physical damage–including the destruction of the prepuce itself [145]–may adversely affect sexual experiences and well-being, which can impact self-esteem, leading to emotional issues and ultimately problems with mental health and quality of life.

Collateral damage can include excessive skin removal causing tight, painful erections; meatal stenosis [146]; 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 [6, 29, 146, 147]. Damage can be compounded by parents requesting second or third circumcisions because the first didn't meet their aesthetic expectations, it left 'too much' skin, or it resulted in complications requiring repair [148].

4.2.1. Physical Harms (Q10, Table 1)

Physical harms reported by participants were wide-ranging (Q10), including dry, keratinized glans, partial/total loss of foreskin, partial/total loss of frenulum, prominent scarring, skin bridges, tight erections, and pubic hair drawn onto shaft. Curiously, only two-thirds (64.3%) of respondents reported "partial or total loss of the foreskin" as a harm, when one might otherwise assume that 100% should have selected this option. A possible explanation for this discrepancy may be that because most respondents were from the United States, where having no foreskin is seen as 'normal,' one-third of respondents may not perceive their absent foreskin as an intrinsic physical harm.

One-fifth (20%) of respondents reported meatal stenosis. This comports with studies which found that since newborn circumcision removes a natural protection against meatal stenosis, this condition occurs in 5-20% of neonatally circumcised males [146, 149, 150], and is a permanent condition unless remedied through surgery. One participant commented:

> "At 21 y.o. I needed surgery, a urethral meatotomy, to mitigate the stenosis, which had caused a lifelong problem with UTIs"

Other participant comments included:

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

"Extreme pain with every erection"

"Pain and bleeding during sex"

4.2.2. Sexual, Emotional/Psychological Harms & Effects on Self-Esteem (Q11-13, Table 1)

4.2.2.1. Circumcision and the Five Circles of Sexuality. Because sexuality is much broader than issues of physiological response, it's helpful to adopt a more comprehensive understanding of the sexual implications of circumcision. *Circles of Sexuality* [151 and Fig. S5] is a well-established theoretical construct of multiple overlapping facets of human sexuality that continue to be used by sexuality researchers, educators, and therapists.

Viewing sexuality as overlapping domains of experience allows for greater nuance in understanding impacts of circumcision and restoration. Most respondents reported multiple undesired effects from circumcision in multiple areas, many of which were also motives for restoration. For example, 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 frustration toward his penis and how it impacts his overall sense of gender; and the *intimacy* circle as we consider his 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.

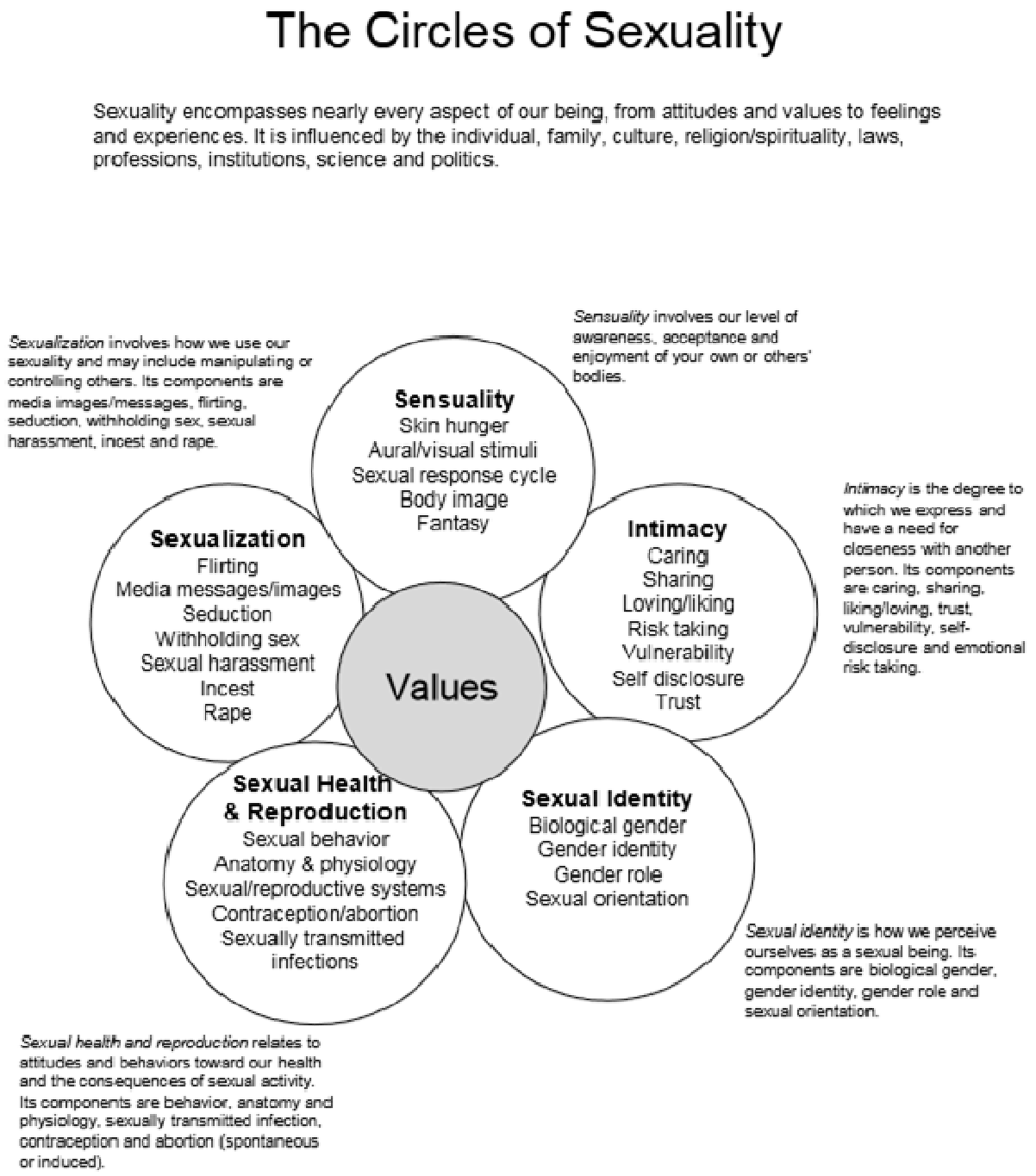

Figure S5. Five Circles of Sexuality

Adapted from a model designed by Dennis Dailey, PhD. Available at: https://www.health.state.mn.us/people/sexualhealth/circlesofsexuality.pdf

Finally, the *sexualization* circle may also apply, insofar as these outcomes, relating to adult sexual life, are ultimately the result a non-consensual (and medically unnecessary) intervention performed on his sexual organs as a child.

4.2.2.2. First Circle: Sensuality. This circle involves internal physical, cognitive, and emotional experiences with sexuality as well as experiences of sexual response. These include the five senses, pleasure, fantasy, and skin hunger. Participants described how these disruptive sensations directly impacted their experiences in the sensuality circle. Many attributed struggles with either premature or delayed ejaculation to altered or reduced penile sensation. Some respondents reported:

> "Significant, distracting sensitivity while chafing against underwear when walking/running"
>
> "Irritation and discomfort from meatus and urethra hole rubbing against clothing"
>
> "Orgasm is a bodily function. It is not supposed to be very difficult to do. The less satisfying it is, the more you seek that satisfaction. It is 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 masturbating, 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 [152]. Analogously, it has been proposed that MGC results in changes within a male's somatosensory cortex [153, 154].

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) [8, 155-157].

Given these sensory experiences, it's easy to see how sexual encounters with partners can be affected. Experiences with pain and irritation associated with sexual response add to other common sources of performance anxiety.

4.2.2.3. 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" [158]. In the present study, 16.26% of respondents attributed alexithymia to their unwanted circumcision (Q12), however most apparently trusted survey authors enough to describe their experiences and emotions within the confines of this survey.

Other respondents discussed experiences with how altered or reduced sensitivity, or sensory irritation from 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 attributed to our respondents' circumcised bodies, including difficulties achieving orgasm, dryness, chafing, and struggles with penetration. Another respondent's partner complained of pain due to his circumcised penis that ended the relationship.

4.2.2.4. 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 'less of a man' or inadequacy in various respects due to circumcision. Others felt that their penises were mutilated and deformed, which they associated with decreased sexual self-esteem.

Some participants identified how struggles with genital self-image within the sexual identity circle interacted with the intimacy circle. One participant noted:

> "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)"

Other participants noted:

"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"

4.2.2.5. Fourth Circle: Sexual Health and Reproduction. This involves biological factors of sexual anatomy and physiology, contraception, reproduction, and the sexual response cycle. Of the five circles, this component is where most of the discourse on sexual implications of circumcision has been conducted. Our participants had a great deal to say about how circumcision adversely impacts their sexual health. Many described experiences ranging from pain during erection and penetration to insufficient sensory experience to maintain arousal and achieve orgasm. Worse still, participants reported recurring injuries that required frequent treatment and inhibited sexual engagement. One participant noted that due to the overwhelming sensory challenges from his circumcision, he compartmentalized urinary function from sexual response, as his 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"

4.2.2.6. Fifth Circle: Sexualization. This circle involves power and influence with regard to sexuality. It can include consensual activities like flirting, seduction, and erotic power play. It also includes nonconsensual behaviors like rape and incest.

Other responses fell within the sexualization circle, expressing feelings of violation and disempowerment due to a procedure performed 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. Many directed anger at parents, doctors, society, culture, and religion. Frequently, participants described feelings of anxiety and depression they attribute to their circumcision. One participant shared a sentiment common among many respondents:

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

The following are among the more painful comments expressed by participants about their circumcisions:

"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"

"Homocidal (sic) rage. Faced with having to rethink *everything*: my parents, 'God', our church, education, media, medical industry, my country, my culture. Utter nightmare of emotions!"

"Thoughts of harming mutilators of children is an understatement. More like constant fantasies of killing them all"

One observer of the effects of penile circumcision noted:

> …being circumcised or not results in different sexual repertoires allowing for different forms of pleasure. …By noting the ways in which circumcision debates have become medicalized and scientifically reductive, …individuals 'forget' that… parents are literally…circumscribing certain types of sexual behavior for their sons and thus limiting exploration of other sexual possibilities of the penis [103].

Since circumcised individuals cannot participate in activities involving foreskin manipulation "...these individuals must rely on a narrower range of physical acts that conform to the contours of their penis." [114].

One researcher [159] concluded that it may be immaterial whether genitally cut persons perceive themselves as harmed, or openly report physical damage, or manifest adverse consequences because, as a UN report emphasized "All forms of violence against children, however light, are unacceptable," adding that "frequency, severity of harm and intent to harm are not prerequisites for the definitions of violence" [160 p10]. Among examples of violent harmful childhood practices cited by that report were male circumcision, female genital mutilation, and sex assignment of intersex children.

The foregoing framework is useful to make the case that the experiences of survey participants *are* sexual in varying and multifaceted ways because they expand concepts of human sexuality beyond physiological response, anatomical and neurological function, injury, and the sexual response cycle. Examples of all five circles can be found in participant responses, and some are even defined by multiple circles. This allows for an expanded examination of sexual implications of circumcision that can better capture the varieties of experiences people have.

As noted above, for most of the foreskin restorers in the present study, the circumcised penis is the source of a negative self-image that goes far beyond sexuality.

4.2.3. Sources of First Awareness of Harm (Q15)

Common sources of first 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." Intactivism (i.e., political activities and resources dedicated to opposing/ending medically unnecessary childhood genital operations) was not a major source of first 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.

As a result of this early awareness, increasing numbers of circumcision sufferers are telling their stories publicly [161]. The following account echoed throughout our survey responses:

> I was first introduced to circumcision, and became aware that it happened to me, when I was almost eleven years old. …It bothered me that someone changed something about my penis when I was a baby without my permission. [162]

Such reporting of early awareness of circumcision harm led one organization to call for child genital cutting to be considered an Adverse Childhood Experience [163], citing research indicating that neonatal pain creates long-term alterations in brain development, and that exposure to pain during a period of rapid brain development can result in major changes to the brain.

One researcher noted that:

> (I)nfants (including neonates) can experience intense pain and show symptoms of traumatization. They are capable of experiencing an event as harrowing and life-threatening. …(T)hese events are capable of being memorialized or symbolically represented, that is stored in memory in a way that can affect later behavior and learning. …(H)ow that traumatization resolves itself, or fails to, can be decisively affected by the functioning of the attachment system. [164]

Since the trauma of infant circumcision occurs in the pre-verbal stage, it may sometimes be difficult for those to whom it occurred to accurately verbalize their feelings. Consistent with longitudinal studies on infant attachment, early circumcision is believed to alter emotional processing and have an impact on adult socio-affective traits or behavior [165].

4.2.4. Lasting Circumcision Trauma: Grief and Suicide

Among those familiar with the lasting effects of early childhood trauma, one psychiatrist refutes the widely-held but erroneous assumption that "If I can't remember it, it can't have (any) effect." He also criticized the denial among some in the medical field that newborn circumcision causes any harm whatsoever [166].

Although circumcision defenders often claim that circumcision pain is trivial and momentary, the truth could be that the pain of foreskin loss may last a lifetime. One researcher found among his interviewees that repeatedly observing circumcision's effects during bathing, urinating or 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, the death of a loved-one, or delayed post-traumatic stress [73 back cover].
>
> Follow-up research that evaluated 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 using humor, cultural aesthetics, controversial health benefits, sexism and an erroneous understanding of penile anatomy and sexual function [167].

The research also found male therapists were more likely to deny circumcision is harmful and were less empathetic than female therapists. The authors recommended methods to make circumcision grief therapy more effective for men.

Viewed holistically, current survey responses suggest that circumcision has been an un(der)-recognized cause of male body-loss grief. Only recently has male circumcision grief been publicly expressed and considered worthy of research. Suicide and suicidal ideation related to circumcision grief is increasingly being discussed by men and reported in the media [168-171].

A pioneering therapeutic effort in the U.K. [172] identified common complaints among circumcision sufferers, including anti-social sentiments, addictions, anger management issues, sexual anxiety and various physical and emotional symptoms similar to the present and previously referenced surveys. As Gollaher noted about circumcision sufferers, “Like victims of child abuse and rape, they voice feelings of powerlessness, vulnerability, and rage” [2 p181].

Current 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" 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 [173].

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" [174]. 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.

4.3. Research Question 2. What Were/Are Their Restoration Experiences and Results?

4.3.1. Personal Experience

Participants reported diverse goals sought from restoration, reflecting the various motivations for starting restoration (Table S5). For some participants who were tightly circumcised it was sufficient to achieve enough slack skin to allow for more comfortable erections and masturbatory experiences.

For those whose chief complaint was a dry, keratinized or desensitized exposed glans, or who experienced constant discomfort from the bared glans chafing against clothing, partial or total glans coverage while flaccid was a reasonable goal. Others whose unprotected urinary opening was persistently irritated from clothing rubbing against the meatus 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, restoration was commonly associated in this sample with additional benefits including: increased moisturization and re-sensitization of the glans, increased sensory input and sensual pleasure relating to the 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.

Pre-restoration, participants reported dissatisfaction/distress, depression, and hopelessness as their top three feelings. Most respondents reported that those negative feelings eased somewhat or were eliminated completely by restoration.

When asked how they dealt with negative feelings before restoration, most participants indicated they experienced no prior coping behaviors, however one-fifth of participants reported having been more sexually compulsive. After restoring, the majority stated that most negative prior coping behaviors were decreased or, in some cases, eliminated entirely.

More than half of all respondents reported increased penile sensation and pleasure resulting from restoration.

Most restorers committed significant time, effort, and money to regain their bodily integrity. However, 18.83% 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 <1 year to 5+ years.

Most participants (75%) said they spent <$500 USD restoring. Over 20% spent $500 to $1000 USD. When asked if restoration caused any harm requiring medical attention, nearly all reported no issues. A few noted minor skin abrasions that were discussed at regular healthcare visits.

Over two-thirds of participants were somewhat or very interested in a less time-consuming, though more costly, approach to restoration through advances in regenerative medicine.

The time, effort and money most restorers were willing to commit to regaining their bodily integrity is impressive, especially absent any professional monitoring or support, which likely explains this comment:

> "I feel I should point out that 'professionals' did this to me in the first place, they're the last people I'd ask for help on this matter"

Similarly, most participants sought peer support from other men in their healing journey. This camaraderie was perhaps best expressed in this response when asked which 'professionals' he consulted:

> "The restoration community! Thank you to all"

4.3.2. Partner Experience

Of those who stated they were in an intimate relationship, most found their partners to be either supportive or neutral toward restoration. Among those who claimed restoration had improved the relationship, many stated it improved sexually, while nearly three quarters said it improved emotionally. A full third said it improved intellectually, while a one-quarter reported it improved spiritually. Poignant comments about how restoration improved the relationship included:

> "While my partner can sometimes become stressed due to my distress, his support and understanding has brought us closer"
>
> "Improved intercourse. Less pain for her! But I am angry that we thought it was 'her' issue for 16 years"
>
> "My wife after a few years of restoring had way more fun with my loose shaft skin"
>
> "My partner had dryness in her vagina and restoration helped during penetration immensely"
>
> "My partner is intact, and restoring helped us engage in sex in a way that's more equitable and pleasing (male partner)"

Teamwork undertaken by a couple to help one partner achieve an important personal goal can be an immensely bonding experience, further strengthening the relationship. Indeed, one respondent uploaded a pre-restoration photo and final photos of his 16-year restoration journey accompanied by self-captioned comments about the positive effects restoration had had on his marriage (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.

Among the 5.92% for whom restoration had worsened the relationship, specific comments were sparse but included:

"My BF is insecure, thinks I want him to restore too"

"She thinks foreskins are gross"

Figure 3. One Respondent's Restoration

Top: Pre-restoration (2004) Bottom: Post-restoration (2020)

A worsened relationship could result from restoration challenging the intimate partner's aesthetic views or forcing them to adapt to new ways of physically and sexually relating to their restored partner. Restoring can also challenge a partner's religious views regarding the correctness of circumcision, or even a partner's past decisions to have their son(s) circumcised. These same issues can arise within circumcised male couples but may leave the non-restoring partner feeling either envious or inferior, or it could cause the non-restoring partner to feel that his restoring partner no longer finds him attractive.

4.4. Research Question 3. What Were Restorers' Experiences with Medical/Mental Health Professionals, or Why Didn't They Reach Out?

As sexuality science developed in Europe and the United States in the 18th to 20th centuries, sexual discourses were limited because it was not viewed as a respectable field for physicians [175]. Current discourse on circumcision in the US is still impaired by this long history of difficulty discussing sexual topics, allowing the anachronistic practice of circumcision to continue in the medical field with limited critical evaluation.

Physicians in the United States who championed 'mental hygiene' and saw masturbation as 'self-abuse' promulgated the unproven potential for circumcision to deter male children from masturbation. Ironically, the reverse was demonstrated in 1997 by researchers who found that "the association between circumcision status and masturbation frequency was quite strong" and based on "lifetime experience of various forms of oral and anal sex and masturbation frequency in the past year, circumcised men engaged in these behaviors at greater rates" [176 p1055].

This suggests that some circumcised individuals might compensate for diminished penile sensation with either more frequent sexual activity or behaviors requiring greater stimulation (e.g., masturbation, oral or anal sex).

Examining this epistemological history is valuable because preexisting cultural suspicions about perceived "sexual excesses" are still present when discussing motivations for circumcision. When working with clients in a psychotherapy setting, therapists regularly address issues of shame and invalidation. When addressing circumcision, it is important to first recognize that these issues *are* sexual in nature.

4.4.1. Attitudes of Medical and Mental Health Professionals

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

"No one, because male genital mutilation isn't taken seriously"

Of the 13.46% of respondents who sought help from a medical or mental health professional during their restoration, 25% reported that the 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 not uncommon remark by one physician who said: "I have never seen an adult with PTSD from a neonatal circumcision. Nobody has ever told me that they regret a circumcision." [177 para26]. Beyond plain ignorance, many professionals are simply unprepared to deal with circumcision sufferers and foreskin restorers, reinforcing mistrust among these patients:

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

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

One participant boasted that his restoration efforts fooled his doctor into believing he was intact. Another shared with his doctor a two-minute time lapse video of his four-year restoration journey [178].

4.5. Circumcisionism: A Contributor to Circumcision Suffering, Grief and Restoration

Lack of understanding and support for circumcision 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" [179], partly based upon "hegemonic conceptions of masculinity and male beauty" [180] and holding false beliefs about unaltered genitalia and the consequences of childhood genital modification [181].

Circumcisionist beliefs may explain why many circumcised men deny being harmed, similar to the denial by their female counterparts in societies that practice FGC. When this denial turns to ridicule of circumcision opponents it can discourage circumcision sufferers from speaking out.

Manifestations of circumcisionism (Box 3) go largely unnoticed or unchallenged, thereby perpetuating the cutting and suffering, impairing sexual and mental health, and motivating the affected to seek remedies in foreskin restoration.

Box 3. How is Circumcisionism Manifested?

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®." [24];
- 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 [2 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].

Many MGC opponents believe that when others ignore valuable preputial physiology and obsessively attempt to justify male circumcision by alleging health benefits–an ethically impermissible position if it were used to justify surgery to promote female genital hygiene or disease prevention–the prepuce is medically demonized, which promotes perceptions that the human penis is so intrinsically flawed and dangerous that it must be surgically modified at birth. One researcher termed this abnormal fear of the male foreskin *prepucephobia* [199].

4.6. The Importance of Being Heard and Validated

The modern foreskin restoration movement's three-decade history demonstrates an impressive ability to organize support systems to address the harms of circumcision and to promote remedies. This has been accomplished absent any understanding or support, and sometimes outright derision, by medical and mental health professionals.

After survey completion, some participants emailed survey authors to express appreciation. Among the comments received:

> "A million thanks to your team for this research and validating those of us who are 'crazy' enough to attempt restoration. It's a long slow process, but I'm very dedicated and have made huge strides in the last 20 months" (AS; 06/24/2021)
>
> "Your survey on foreskin restoration really touched me and made me feel understood. I am someone who tried and abandoned foreskin restoration. I have so many profoundly negative feelings about circumcision and I carry that with me every day" (LR; 06/24/2021)
>
> "Thank you for your work, this information transformed my life" (WE; 06/26/2021)

> "Very few people ask the questions that your survey asked. Being cut as a child, coping with the aftermath of anger, and restoring has occupied a huge chunk of my time and mental health. It was very refreshing to feel like someone, somewhere actually cared" (MV; 07/13/2021)
>
> "Circumcision deformed my natural penis. Your survey validated my restoration and my belief that circumcision was not something done 'for' me but 'to' me!" (TS; 08/20/2021)

4.7. The Need for Improved Services from Professionals

When participants were asked if professionals need to be 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'.

Overall, survey participants believe that the professional community is uneducated about concerns of circumcision sufferers and are ill-prepared to offer foreskin restorers the understanding and assistance needed to support them in their restoration journey. This could explain why the restoring community remains rather insular and isolated from health professionals.

4.8. 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) (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"

Among the reasons for responding 'no' were:

"Takes too long"

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

"Severed nerve endings are irreplaceable."

Among the reasons for selecting 'unsure' were:

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

"Restoration caused discomfort while flaccid"

"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"

Overall, participants were enthusiastic about what they accomplished with non-surgical restoration and were willing to offer encouragement and support to others.

4.9. A Better Formula: Potential Advantages vs. Inherent Disadvantages

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 risks of newborn/childhood circumcision can no longer be limited to short-term surgical complications, but must 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.

Our results suggest that a more productive formula would be "*potential* advantages vs. *inherent* disadvantages" of circumcision (i.e., the *alleged* reduced risk of disease, improved aesthetics, and social conformity vs. *observable* loss of bodily integrity, penile glans protection and visible scarring, as well as *reportable* deficits in erogenous sensation, increased risk of feeling mutilated or violated, and often undesirable aesthetic outcomes because "Not all circumcisions are created equally, some are more aesthetically pleasing than others, and some are less successful in the eyes of the beholder" [200]).

4.10. The Overlooked Violation of Human Rights

The very existence of a global foreskin restoration community raises the question of who should be allowed to authorize such a 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*" (e.g., parents) [201 p315, 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 perform a genital surgery on a child patient who does not, in fact, need it.

This includes the primacy of the principles of human rights over our own bodies and of patient autonomy, which "is now universally accepted" [202 p569].

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 is a harmful traditional practice perpetuated by social forces (medicine, religion and 'parental rights') that violates the rights of the child and to which human rights gatekeepers grant excessive deference [29, 156, 160, 191, 195, 196, 203-207].

4.11. 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 (i.e., as a potential comparison group).

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.

While this survey attempted to assess the effect of circumcision distress and foreskin restoration on intimate and other personal relationships, it did not inquire about effects of such distress or restoration efforts upon work life, or effects on intergenerational familial relationships (parents, siblings, children) and how those relationships might influence the desire or ability to restore.

Only descriptive data is gathered and reported. No correlational conclusions or causal inferences can be drawn.

Our sample was recruited primarily through online forums and anonymous contacts of individuals who had purchased restoration devices, which limits generalizability. Our sample consists of predominantly white, heterosexual, highly educated English-speaking men under the age of 40 who were born or reside in the US, were circumcised non-religiously as newborns, and who mostly identify as either Christian, Atheist/Agnostic or None. We do not know how representative these characteristics are among most men seeking foreskin restoration.

Comments chosen to highlight each section are based on how well they represented our key themes as defined by our participant responses. Because we did not conduct a systematic qualitative analysis of open-ended responses, the comments we chose are meant to highlight the quantitative data, but should not be interpreted as being representative of all response data. Future research could explore outcomes using a longitudinal study pre- and post-restoration and could incorporate psychometrically validated, quantitatively-based self-report measures.

Despite these limitations, this survey is the first known empirical attempt to explore and gather such a significant amount of rich, descriptive data from a relatively large number of participants who were/are engaged in foreskin restoration.

4.12. Recommendations

Below we formulate recommendations to assist with better understanding of direct long-term adverse effects of penile circumcision on different populations and 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; to better inform parents about potential adverse impacts of childhood MGC; and to reduce the incidence of non-therapeutic MGC to the point that non-therapeutic newborn male circumcision is no longer considered to be within the standard of care by physicians and hospitals.

4.12.1 Researchers

- Circumcision status should be included in future research questionnaires dealing with Post Traumatic Stress Disorder (PTSD), Adverse Childhood Experiences (ACE), self-esteem, sexual abuse, drug abuse, and body image/dysmorphia.
- Efforts should be made to define base rate estimates regarding the prevalence of those who are distressed by unwanted circumcision, a highly relevant factor to include in future public policy statements about non-therapeutic newborn/childhood circumcision.
- Future scientific research might consider these questions:
    - Does functional magnetic resonance imaging (fMRI) among intact, circumcised, and restoring males reveal neurological reorganization in the somatosensory cortex and other areas of the brain involved in sexual response?
    - Do levels of sexual compulsivity differ between intact and neonatally circumcised men?

- Does mistrust of the medical profession by neonatally circumcised men contribute to their reluctance to utilize health care systems?
- What role (if any) does male circumcision play in women's experiences of vaginal dryness during sex and how does a male partner's restored foreskin affect (if at all) these women's sexual experiences?
- What impact does non-therapeutic neonatal circumcision have on physical, sexual and emotional health and self-esteem of gay/bisexual men and transgender women?
- Do concerns about an unwanted circumcision contribute to suicidal ideation or actions among affected teenagers and adults?

4.12.2. Medical and nursing schools

- Update medical school textbooks and develop continuing education programs for current medical professionals about the unique anatomy, physiology, development and proper care of the penile prepuce, as well as non-surgical/tissue-sparing prophylaxis and treatment alternatives to circumcision.
- Expand human sexuality education of physicians in North American medical schools to include preputial anatomy and physiology, as well as sensitivity training about circumcision distress and foreskin restoration.
- Because pediatric residents "lack confidence in providing parents advice on preputial care and are unlikely to offer such advice" and "(W)hen offered, the advice given is highly variable" [208], education of medical students about care of the intact penis must be improved.

4.12.3. Mental health professionals

- Update the Diagnostic and Statistical Manual (DSM) to include a category for trauma and genital dysphoria associated with adverse physical, sexual, emotional, psychological and self-esteem outcomes from non-therapeutic newborn/childhood penile circumcision, circumcision-related distress, grief and suicide.

4.12.4. Hospitals

- Adopt a policy of 'Don't Ask, Don't Sell' that refrains from actively marketing newborn circumcision and/or providing unsolicited circumcision consent forms. Instead, staff should provide educational literature to parents about foreskin anatomy, functions, development and care and dissuade parents who request non-therapeutic newborn circumcision.
- If parents cannot be dissuaded, a robust circumcision consent form should present non-surgical alternatives to achieve the same alleged benefits as circumcision, as well as comprehensively listing surgical risks and disadvantages (including potential for later circumcision dissatisfaction, distress, or grief).
- Adopt consistent policies governing the ethics of non-therapeutic genital surgeries on children, regardless of sex.

4.12.5. Medical Insurance Providers

- 'Level the playing field' by ending institutionalized funding of non-therapeutic childhood circumcision by all state Medicaid programs and private health insurers.

4.12.6. AAP and Other Policy-Making Bodies

- Medical associations must assume greater responsibility and leadership to help physician members address parents' unreasonable medical and/or social fears about children's intact genitalia.
- The AAP must acknowledge in its policy statements and parental education materials on newborn circumcision that increasing reports of adverse long-term consequences, which become apparent in later childhood or adulthood, have not been adequately researched, and that there is increased interest in foreskin restoration among some circumcised men.
- Because past AAP circumcision task forces were dominated by white, admittedly heterosexual males, who were among the cohort born in the US when infant circumcision was nearly universal, and/or whose personal, religious, or cultural bias may have influenced past policy statements, future task forces should be more diverse to include younger members, those who actually have an intact foreskin, people of color, those of various sexual orientations, gender identities, religions and national origins; as well as contemporary ethicists who understand the need to harmonize medical policies involving childhood genital surgeries across sex and gender; and should include listening sessions to hear testimonies from circumcision sufferers and foreskin restorers.
- The child's right to bodily integrity and respect for genital autonomy, regardless of sex or gender, should be recognized in future policy statements made by all relevant medical associations, ethics councils and human rights organizations.

- All relevant entities mentioned above should follow the lead of the World Association for Sexual Health by affirming its declaration that "Sexual pleasure should be exercised within the context of sexual rights, particularly the rights to equality and non-discrimination, autonomy and bodily integrity..." [209].

5. Conclusion

Foreskin restorers constitute an under-recognized and understudied, yet not insignificant, population of patients who systematically seek to undo the surgeon's work. If circumcision were as beneficial (or as harmless) as suggested by policy statements from the AAP, CDC and WHO, there would be no interest in uncircumcision. The very existence of a global foreskin restoration community is indicative of serious long-term issues with involuntary non-therapeutic MGC that must be addressed.

Our survey results provide insights into lives of these individuals, most of whom identify as cisgender/endosex men, along with a small percentage who identify as transgender women or intersex persons. 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 expect compassionate assistance.

The present findings offer insights into how two subsets of the circumcised population (i.e., circumcision sufferers and foreskin restorers) have been (ill)served by medical and mental health professionals, and should alert professionals, as well as general society, about the previously unacknowledged and under-researched adverse outcomes of non-therapeutic childhood penile circumcision. In the 21st century, foreskin restorers may be 'canaries in the coal mine' such that non-therapeutic, socially motivated newborn circumcision–once dubbed by Wallerstein [32 p197] as a "solution in search of a problem"–may itself have become a problem.

These findings point to a need among healthcare professionals to improve services to these populations, as well as a need for future policy statements about newborn circumcision to recognize that, for some, the cutting *is* the harm and that some individuals are seeking foreskin restoration to remedy adverse outcomes that include circumcision dissatisfaction, distress and grief, any or all of which are impossible to predict before imposing this permanent genital modification upon a child.

Data Availability Statement

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

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Author Contribution Statement

This investigation was inspired 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 a 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 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.

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.

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.

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