

Infant circumcision and adult penile sensitivity: implications for sexual experience

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A recent study reported that neonatal circumcision is not associated with changes in adult penile sensitivity, leading to viral coverage in both traditional and online media. In this commentary the author questions the conclusions drawn from the study and explores the relationship between objective assessments of penile sensitivity and subjective sexual experience and satisfaction. The author concludes with suggestions for improving future research.

What are the effects of infant male circumcision on adult penile sensitivity? Given that male circumcision is the most common paediatric surgery performed in the USA, in contrast to peer nations where the surgery has either fallen out of favour among health professionals or was never a medical norm to begin with,^{1,2} it seems important to investigate this issue in as careful a manner as possible. In this way, parents who may be facing 'the circumcision decision' can be adequately informed about the potential consequences of the surgery for their child, at least along this dimension. Due in part to the

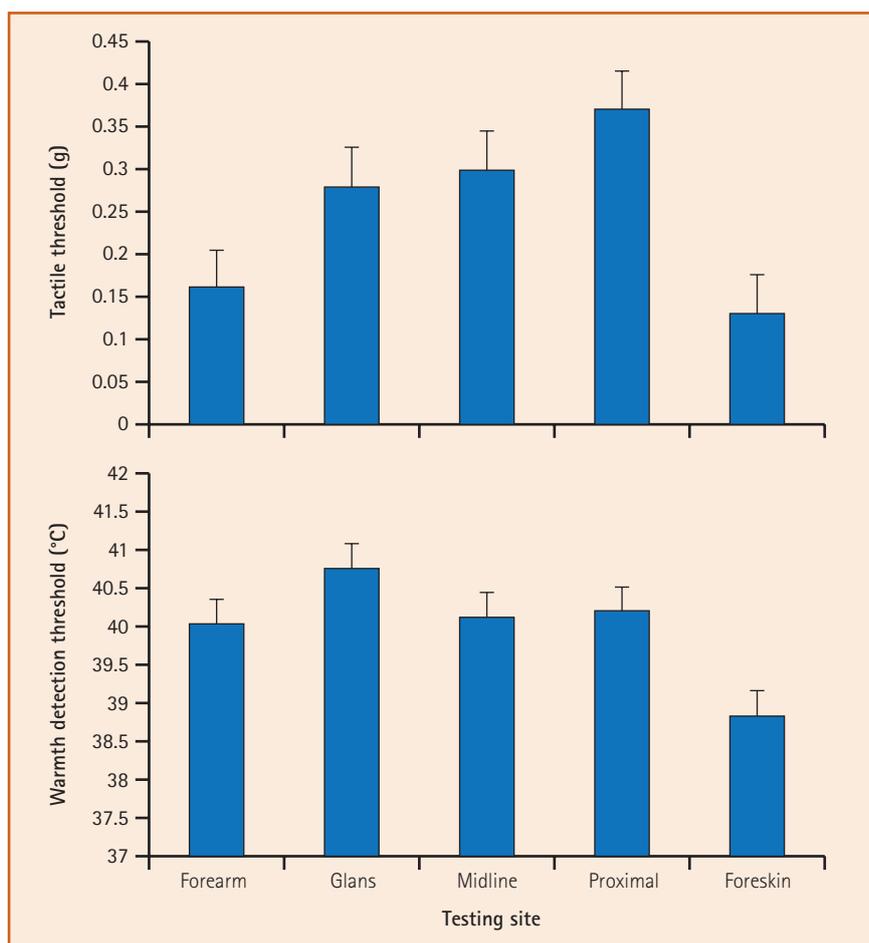


Figure 1. Tactile (top) and thermal (bottom) sensitivity thresholds across various parts of the penis and the forearm (used as baseline). A lower bar means more sensitive. The foreskin is the most touch-sensitive of the sites tested (adapted from Bossio et al)⁵

polarised nature of scientific research on circumcision,³ the medical literature to date has offered conflicting answers to the question of sensitivity,⁴ prompting a recent turn to quantitative analyses relying on putatively objective measures.

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BLOG**Circumcision and penile sensitivity: the debate continues**

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In the latest such study,⁵ Bossio, Pukall and Steele measured penile sensitivity in circumcised and genitally intact men using two complementary methods: the application of modified von Frey filaments to assess tactile sensitivity at various locations on the penis (for a video demonstration of this general testing procedure, see <https://www.youtube.com/watch?v=j5mcWPYi3Zc>); and a thermal analyser to assess absolute detection thresholds for sensations of warmth and heat. The authors report that their findings 'suggest minimal long-term implications for penile sensitivity [as] a result [of] neonatal circumcision', thereby challenging 'past research suggesting that the foreskin is the most sensitive part of the adult penis'.⁵

This conclusion was subsequently disseminated via a university press release,⁶ garnering significant coverage in both traditional and online media outlets, including the *New York Times*.⁷ Notably, such coverage largely repeated the main points from the press release without incorporating critical perspectives from other scientists, effectively taking the findings for granted.^{8,9} Sample headlines included: 'Circumcision does NOT reduce sensitivity of the penis' (*Daily Mail*); 'Study finds no difference in sensitivity between circumcised versus non-circumcised men' (*Northern California News*); 'Foreskin doesn't make a man more sensitive, study finds' (*Vox*); and 'We finally know whether or not being circumcised affects sexual pleasure' (*Elite Daily*).

But is this what the study actually found? This article will demonstrate that not

one of these 'headline' conclusions can responsibly be drawn from the findings of the study. In fact, the authors' own stated conclusions – concerning 'minimal long-term implications for penile sensitivity' – conflict with their published data. This episode, then, provides a good opportunity to reflect on some of the ways in which controversial men's sexual health findings can be misinterpreted and misconveyed to the wider public, thereby biasing subsequent discourse on the subject.¹⁰ It also offers a chance to explore the relationship between objective studies of penile sensitivity and subjective experiences of sexual satisfaction, and to ask how studies in this area could be improved going forward.

“The implications of the study for our understanding of the relationship between neonatal circumcision and adult sexual experience are limited”

WHAT DID THE STUDY SHOW?

To understand the implications of the study by Bossio *et al*, one can begin with the results section of their paper. According to the authors' own Figure 2, the foreskin – that is, the part of the penis that is removed by circumcision – is significantly more sensitive to tactile stimulation than any other assessed part of the penis; and it is significantly more sensitive to warmth than the penile glans (Figure 1). The researchers failed to find a statistically significant difference between the foreskin and other penile sites in terms of sensitivity to painful stimulation (both tactile and heat-induced); given that pain is typically understood to be unpleasant, however, this plausibly should not be construed as a downside.

Previous research has shown that the foreskin is richly supplied with nerve

endings,¹¹ although the type and distribution of nerve endings and their role in sexual response is contested by some researchers. The foreskin makes up a substantial portion of the integrated penile skin system,¹² with a mean surface area of approximately 30–50cm² in the adult organ.^{13,14} Hence, to remove this tissue is to reduce penile sensitivity by definition (no one disputes that the foreskin is sensitive to touch). In particular, all sensitivity afforded by the foreskin itself is necessarily eliminated, as are all subjective sensations that accompany the manipulation of this tissue during sexual activity.¹⁵ Chief among these sensations may be the feeling of gliding or everting the foreskin back and forth over the penile glans (a distinctive motile gesture that is precluded by circumcision).¹⁶

When Bossio *et al* state that 'neonatal circumcision is not associated with changes in penile sensitivity', therefore, they make a conceptual error. This would be roughly akin to stating that neonatal removal of the little finger is not associated with changes in hand sensitivity, or, more directly, that neonatal labiaplasty is not associated with changes in vulval sensitivity. Given that the little finger is a part of the hand and that the labia are part of the vulva, and since each of these structures is sensitive in its own right, such statements cannot logically be true. What Bossio *et al* may be trying to convey is that there does not appear to be a meaningful sensory difference between circumcised and intact men in terms of the specific parts of the penis that are not removed by circumcision (in particular, the glans), setting aside surgical mishaps. That is a different claim, however, and the evidence adduced in support of it is far from conclusive.

SAMPLING LIMITATIONS IN THE STUDY

Firstly, the study is limited by its small sample size of only 62 men (30 circumcised, 32 intact) from a single city (Kingston) in Canada. As the authors

explain in their paper, this means that several tests were underpowered, which reduces the ability to draw valid inferences from any associated null results. Secondly, the study is limited by the constricted age range and homogenous sexual function status of the participants: the maximum age was 37 years (mean age 24.2 years) and participants were pre-selected to be free of sexual problems (see below). If circumcision is a risk factor for sexual problems, therefore, this cannot have been shown in the present study by design.

Nor does the study tell us anything about potential differences between circumcised and intact men in terms of reduced penile (including glans) sensitivity beyond the age of 37. Yet research suggests that concerns about sexual functioning begin to increase markedly after this age.¹⁷⁻¹⁹ To see why this selection bias presents a problem for drawing general conclusions, one need only to imagine a study exploring the association between, say, smoking and respiratory capacity that excluded patients with chronic cough conditions over the age of 50.

Toward the end of their paper, Bossio *et al* state: 'Results from the current study, examining four types of stimulation over multiple testing sites, indicate that foreskin removal is not associated with [...] sexual dysfunction! However, in their methods section, the authors state that one of the exclusion criteria for participation in the study was 'past/present sexual dysfunction! It is simply not possible to draw meaningful conclusions about the effects of infant circumcision on sexual dysfunction in adulthood by first excluding men with sexual dysfunction from the study sample.

FROM STATIC SENSITIVITY TO DYNAMIC SEXUAL ACTIVITY

More generally, the implications of the study for our understanding of the relationship between neonatal circumcision and adult sexual experience are limited.

KEY POINTS

- **The findings from a recent, widely read study claiming that infant male circumcision does not affect adult penile sensitivity do not support this 'headline' conclusion**
- **The relationship between 'objective' measures of penile sensation and function and 'subjective' sexual experience is more complicated than studies of this kind can show**
- **Suggestions for methodological improvements in this area include focusing on individual differences in sexual activity, sexual attitudes and qualitative sexual sensation, extending follow-up into older age and exploring a wider range of sexual outcome variables**
- **From an ethical perspective, a precautionary approach weighs against infant male circumcision unless there is a genuine medical indication**

This is true as well for other studies employing similar methodologies, such as that by Sorrells *et al*, which assessed fine-touch pressure thresholds in the adult penis using a Semmes-Weinstein monofilament touch-test, comparing intact with circumcised men.²⁰ Sorrells *et al* reported that 'Circumcision ablates the most [touch] sensitive parts of the penis' (note that various critiques and counter-critiques of this study are available at the journal website).

Why are the implications limited? There are several reasons. Firstly, although the paper does not state so explicitly, Bossio *et al* appear to have performed their sensory tests on the penis in its flaccid state, which is not the state that most penises will be in during many types of sexual activity. Secondly, their sensitivity tests involved the static application of stimuli, whereas sexual stimulation is typically non-static. These very basic differences between the circumstances of the laboratory study by Bossio *et al* and most real-life sexual activities decrease the interpretability of associated findings.

Moreover, as noted earlier, the foreskin is an integrated component of the intact penile skin system, such that there is no determinate location where the foreskin 'ends' and where the rest

of the penis 'begins'. 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.

Finally, the authors tested only a single location on the outside of the foreskin, whereas the inner layer of the foreskin – which becomes exposed when the foreskin is pulled back, as it is during some forms of masturbation and sexual intercourse – has different anatomical properties.¹² One such property is the relatively softer, mucosal surface, which could reasonably be expected to elicit different subjective sensations when being stimulated compared to the protective outer skin layer of the foreskin. These sensations were not assessed.

PSYCHOLOGICAL FACTORS

Further limitations stem from a lack of consideration of individual differences in psychological profiles. As Johnsdotter has recently argued,²¹ research in this vein tends to rely on reductionist constructions of sexuality, which emphasise primarily the roles of anatomy and physiology in 'framing and describing sexual activities'. However, socially informed 'sensation

schemas will impact how we perceive bodily signals, whether we notice them at all, and what kind of meanings we ascribe to them'. Needless to say, 'Such complexity is difficult to capture in quantitative studies'.

Consider that some boys will grow up to regard their circumcision as an improvement compared to the natural state, while others will view the same excision of tissue as a diminishment or even a mutilation.^{22–25} For instance, a man may wish that he had been able to experience sex with his foreskin intact; he may be curious about what it would have been like to be able to 'play' with that tissue (or have his partner do so) and feel resentful that this option was taken away from him. Other men, by contrast, will regard their circumcised state neutrally or even positively, particularly if they were socialised in a cultural context that regards circumcision as the norm.²⁶ What is important to recognise is that the sexual implications of the surgery are likely to differ between such cases due to mediating psychological factors.

Even purely 'physical' factors may be experienced differently. For example, some men may believe that they are 'too sensitive' (and therefore struggle with premature ejaculation); whereas other men do not feel 'sensitive enough' (and may consequently struggle with a lack of sensation and/or erectile dysfunction). Men are not identical when it comes to penile anatomy, including with respect to such attributes as density and distribution of nerve endings, the surface area of the foreskin, and so on. Circumcision, therefore, whether carried out in the infant period or later in adolescence or adulthood, is unlikely to have uniform effects.

CONCLUSION

Future studies on penile sensitivity should explore individual differences in attitudes toward circumcision, along with relevant psychological and contextual mediators. By contrast, the current tendency to draw

broad conclusions about the effects of neonatal circumcision on adult sexuality from group 'averages', thereby obscuring the responses of individual participants, is problematic. No one engages in sexual activity as an embodied statistical average; instead, each person's sexual experience is unique. Moreover, it will be important to explore a wider range of sexual outcome variables and to do so with longer-term follow-up into older age.²⁷ In the meantime, a precautionary approach suggests that non-therapeutic circumcision should generally not be performed until boys can 'assess the sensitivity of their own foreskins as compared to other parts of the penis – as well as their role in sexual experience more generally – in light of their own considered sexual preferences and values'.^{8, 28–30}

Declaration of interests: none declared.

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