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Urogenital Health in Cyclists: Implications for Sports Medicine

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Abstract

Background. Cycling is a globally popular form of active transport, recreation and competitive sport, valued for its cardiovascular and metabolic benefits. The prolonged, forward-flexed seated posture characteristic of riding loads the perineum and has prompted longstanding concern about urogenital health in both sexes.

Objective. To synthesize current evidence on urogenital health in male and female cyclists and to translate it into practical implications for sports medicine.

Methods. Narrative review of peer-reviewed studies spanning cycling epidemiology, perineal biomechanics, lower urinary tract symptoms, sexual dysfunction, prostate markers, genitourinary trauma, perineal pain and preventive strategies.

Overview. Genital numbness, saddle sores and perineal pain are the most consistently reported complaints in both sexes and increase with riding volume. Evidence linking cycling to erectile dysfunction is conflicting and not supportive of a simple causal relationship; women report more urinary tract infections and numbness than comparable athletes; cycling does not appear to elevate prostate-specific antigen; mountain biking is associated with scrotal abnormalities; and acute genitourinary trauma is uncommon, with the kidney most often injured. Saddle design, handlebar height, padded shorts and intermittent standing measurably modify perineal pressure and symptoms.

Conclusions. For most riders the benefits of cycling outweigh its urogenital risks. Symptoms are common but largely modifiable through equipment and positioning; women remain understudied. Sports medicine practitioners should incorporate symptom enquiry, bike fit and saddle selection into routine care.

Keywords: cycling, urogenital health, perineal pressure, pudendal nerve, erectile dysfunction, genital numbness, saddle design, pelvic floor, sports medicine

Introduction

Cycling is among the most widely practiced forms of physical activity worldwide, fulfilling overlapping roles as a mode of active transport, a recreational pastime and a competitive sport [1,2]. Its cultural profile has broadened in recent decades, with road cycling in particular recast by many middle-aged recreational riders as a sociable, loosely structured leisure activity [1]. National travel surveys reveal large differences between countries in cycling's share of journeys, ranging from around 1% in several Anglophone nations to more than a quarter of all trips in the Netherlands [2]. In Central and Eastern Europe uptake remains comparatively modest and is strongly shaped by infrastructure provision, perceptions of safety and the behavior of motorists [3,4]. Across all of these settings, cycling is consistently promoted for its cardiovascular, metabolic and environmental benefits [2,5].

The social distribution of this uptake is itself informative. In Poland, for instance, only about one in ten adults commutes by bicycle and fewer than 8% do so frequently; cycling there is often the recourse of less advantaged groups rather than a freely chosen leisure pursuit, and national survey data distinguish “conscious”, “forced”, “pro-health” and “lifestyle” commuter profiles that rate infrastructure, safety and drivers’ behaviour very differently [3]. Who rides, and why, therefore conditions both the pattern of exposure to saddle loading and the likelihood that any resulting symptoms are ever brought to clinical attention.

Set against these benefits is a recurring clinical concern: the bicycle saddle places sustained mechanical load on the perineum, the region that houses the neurovascular structures supplying the external genitalia and the lower urinary tract. Riding is typically performed in a forward-flexed posture that may be sustained for hours, and overuse complaints are common; pain is reported by roughly two thirds of recreational and competitive road cyclists [6], and lower back and pelvic pain has been linked to lumbar posture on the bicycle and to gluteal muscle function [7].

These overuse complaints are strikingly common yet map poorly onto simple postural explanations. The reported prevalence of overuse injury in cyclists reaches roughly 85% in some cohorts [7], but when riders with and without pain are compared directly, static body position on the bicycle differs only trivially between them, and self-reported comfort is a poor predictor of overuse-injury risk because most riders report pain and comfort at the same time [6]. This weak coupling between a measurable exposure and a reported symptom recurs throughout the urogenital literature and is worth keeping in view when interpreting sections that follow.

The term urogenital (or genitourinary) symptoms encompasses two broad and overlapping domains. The first is sexual dysfunction – in men, erectile dysfunction (ED) and genital numbness; in women, reduced genital sensation, dyspareunia and impaired arousal or orgasm. The second is urinary and lower urinary tract symptoms (LUTS), including voiding and storage complaints, urinary incontinence, dysuria and urinary tract infection (UTI). Allied to these are perineal and pelvic pain syndromes, saddle sores and, in men, prostate-related concerns [5,8]. In the general population, sexual and urinary dysfunction become more frequent with advancing age and comorbidity. Among cyclists, certain complaints appear disproportionately: genital numbness, saddle sores and, in women, UTIs are reported far more often than by comparable runners or swimmers [9], and symptom frequency tends to rise with riding volume [10]. Whether such complaints translate into clinically meaningful dysfunction, particularly ED in men, remains contested [11,12].

The aim of this review is to synthesize current evidence on urogenital health in male and female cyclists across the domains of perineal biomechanics, urinary function, sexual function, prostate health, genitourinary trauma and perineal pain, and to translate these findings into practical, evidence-informed implications for sports medicine practice.

Methodology

This article is a narrative review. Peer-reviewed publications were assembled to represent the principal thematic domains of cycling-related urogenital health: cycling epidemiology and context; the biomechanics of perineal loading; lower urinary tract and urinary symptoms; sexual dysfunction in both sexes; prostate-specific antigen, prostatitis and prostate cancer; genitourinary trauma; perineal and pelvic pain including pudendal neuropathy; and preventive and equipment-based strategies.

The evidence base comprises study designs of differing strength, including large multinational cross-sectional surveys, smaller observational and case–control studies, an imaging study of perineal tissue deformation, narrative and systematic reviews, meta-analyses and a textbook chapter. Only English-language sources were considered. Consistent with a narrative rather than a systematic approach, no protocol-driven database search, predefined eligibility hierarchy or quantitative pooling was undertaken, and no formal risk-of-bias appraisal was performed; the findings are integrated qualitatively. This approach permits breadth across heterogeneous topics and across both sexes, but it carries recognized limitations of narrative synthesis, including potential selection and reporting bias and limited comparability between studies that use different instruments and symptom definitions.

Overview

Biomechanics of cycling and perineal loading

The seated cyclist supports a substantial proportion of body weight on the saddle, transmitted in part through the perineum rather than solely through the ischial tuberosities, particularly in a forward-leaning position. In this posture the perineum is pressed anteriorly against the saddle nose and the underlying bony structures, compressing the soft tissues that carry the pudendal nerve and the cavernosal and dorsal arteries – at sites including the region between the saddle and the pubic symphysis and within Alcock's canal medial to the ischial rami [13]. Sustained compression can reduce perineal blood flow and impair nerve conduction; experimental observations suggest that nerve ischaemia of short duration is rapidly reversible, whereas more prolonged compression may require weeks for recovery [13].

The temporal thresholds underlying this mechanism have been described more precisely. Experimental work cited in this literature suggests that when nerve ischaemia arising from a compressive posture lasts less than roughly six hours the conduction block is rapidly reversible, whereas ischaemia persisting beyond about eight hours may require weeks of recovery, consistent with a demyelinating block produced by sustained direct pressure on the perineum [13]. Susceptibility, moreover, is not confined to novices: experienced and elite riders who accumulate long hours of seated exposure are equally liable, which frames pudendal symptoms as a dose-related hazard of the activity rather than simply a marker of poor technique.

Direct imaging supports the magnitude of this loading. Using open magnetic resonance imaging to reproduce cycling postures, one study measured marked compression of perineal soft tissues when seated compared with standing: in a cruising posture, penile tissue, the bulbospongiosus muscle and perineal adipose tissue were compressed by up to roughly 70-83%, with still greater deformation in a lower, racing-style position [14]. Although based on very few participants, these findings illustrate how rider position governs the degree of perineal deformation and, by extension, the potential for vascular and neural compromise.

The saddle-perineum interface is therefore the central determinant of risk, and variables that modify it: saddle shape and width, the presence of a cut-out, handlebar height and the proportion of time spent standing recur throughout the literature on both symptoms and prevention [9,15,16].

Lower urinary tract symptoms and urinary function

Evidence on urinary symptoms in cyclists is mixed and differs by sex. A broad review of cycling and renal-urological health concluded that, while cycling improves cardiovascular and metabolic health, it is also associated with urological symptoms, more so in women, and with genital numbness in both sexes [5]. In the largest survey of male cyclists, men did not show worse urinary symptom scores than swimmers or runners, although they had higher odds of urethral stricture [9]. Likewise, in a study of healthy men belonging to cycling clubs, club membership was not associated with increased LUTS or erectile dysfunction relative to non-cyclists [17].

The single urinary outcome that clearly distinguished male cyclists from other athletes was urethral stricture, for which cyclists carried roughly two-and-a-half times the odds of swimmers or runners [9]. Tellingly, the same dataset recorded marginally higher validated erectile scores in cyclists than in the comparison athletes, illustrating that an elevated structural risk in the urethra can coexist with preserved sexual function and cautioning against reading any single raised odds ratio as evidence of global harm.

Cumulative exposure may nonetheless matter. A hypothesis-generating study of male cyclists found a modest correlation between the number of years spent cycling and lower urinary tract and prostate symptoms, independent of age, suggesting that long-term, high-intensity riding may exert a small negative effect on some men's pelvic floor function [18].

In women the urinary picture is more pronounced. Compared with non-cyclists, both lower- and higher-intensity female cyclists reported more previous UTIs, together with substantially higher odds of genital numbness and saddle sores, even though they were not more likely to report sexual dysfunction or core urinary symptoms than runners or swimmers [9]. Female club cyclists frequently described dysuria and stranguria after prolonged rides, with wider saddles associated with these complaints [19], and a urological review similarly linked regular female cycling with dysuria and recurrent urinary infection [8]. Overall, urinary complaints in cyclists appear common, often transient, and strongly shaped by sex and equipment.

A dimension almost entirely distinct from perineal loading, but repeatedly raised in the renal-urological literature, concerns the kidney's response to sustained endurance effort rather than to the saddle. Beyond the mechanical and neurovascular phenomena that dominate this review, prolonged and intense cycling has been associated with transient markers of renal stress – dehydration, biochemical evidence of muscle damage, elevated inflammatory markers and reductions in glomerular filtration rate in the hours after hard or protracted rides – with

nutritional measures such as adequate sodium intake and L-tryptophan supplementation proposed as aids to recovery [5]. These changes appear largely acute and reversible and sit outside the saddle-interface framework, but they are worth noting because they extend the notion of “urogenital health” in cyclists beyond the perineum, and because their long-term significance in very high-volume athletes has not been quantified.

Sexual dysfunction in men and women

The relationship between cycling and male sexual dysfunction, particularly ED, is the most debated area of this literature, and the evidence is genuinely conflicting. A narrative review concluded that saddle type and rider position influence sexual dysfunction more than participation in cycling itself [11]. Several large studies found no excess of ED among cyclists: men in cycling clubs did not differ from controls [17], and a population study of more than five thousand male cyclists found no association between weekly cycling time and ED or infertility [20]. By contrast, a meta-analysis that pooled studies using validated instruments found that, after adjustment for age and comorbidities, cyclists had approximately twice the odds of ED compared with non-cyclists, while cautioning about marked heterogeneity between studies [12].

Part of this discord is methodological rather than substantive. In the large multinational dataset, male cyclists in fact recorded slightly higher validated erectile scores than swimmers or runners (Awad et al. 2018), while the meta-analysis that reported roughly doubled odds of erectile dysfunction found no difference at all in its unadjusted comparison; the association surfaced only after adjustment for age and comorbidity, and rested on just six eligible studies drawn from more than eight hundred screened [12]. Whether that adjustment unmask a genuine effect or introduces one is difficult to adjudicate, which is precisely why the same evidence base can be read as reassuring or as concerning depending on the analytic choices emphasized.

Genital numbness lies at the center of this debate. Numbness is reported by a majority of male riders and increases with years of cycling, weekly frequency and ride distance [10].

However, in a large multinational analysis, numbness was not associated with worse validated erectile scores overall, except in the subgroup reporting buttock numbness [10]. Other work found that men reporting penile numbness, or whose pain or numbness began early in a ride, were more likely to report ED, implying that the timing and location of symptoms may matter more than their mere presence [21].

Where an association with erectile dysfunction does emerge, it tracks the character of the symptom rather than cycling exposure as such. Among more than sixteen hundred predominantly middle-aged male riders, erectile dysfunction, genital pain and genital numbness were reported by roughly 22%, 30% and 57% respectively, and no saddle characteristic predicted the development of numbness; instead, penile rather than buttock numbness, and above all pain or numbness that began within an hour of starting to ride, carried the highest odds of concurrent erectile dysfunction [21]. The temporal and anatomical signature of a symptom thus appears more informative than its mere presence.

In women, sexual complaints follow a parallel pattern. Genital numbness is common among female riders and is associated with an increased risk of female sexual dysfunction, particularly when the numbness is perineal or vulvar or of longer duration [22]. Female club cyclists reported insertional dyspareunia, vulvar discomfort and oedema, changes in sexual sensation and difficulty reaching orgasm attributable to cycling. Such complaints were largely absent in runners [19]. However, as for men, several comparisons found no overall excess of sexual dysfunction relative to other athletes [9], underscoring that genital numbness and discomfort, rather than frank dysfunction, are the dominant and most consistent sexual-health signals in cyclists of both sexes.

The female evidence contains a comparable paradox. In the multinational survey, high-intensity female cyclists actually reported lower odds of self-reported sexual dysfunction than non-cyclists [9], and cycling volume – lifetime mileage, ride duration, frequency, distance, speed and even riding surface – showed no significant relationship with genital numbness in women [22]. This contrasts sharply with men, in whom numbness rises steadily with years ridden, weekly frequency and per-ride distance [10], and it suggests that the dose–response logic so often assumed for perineal symptoms may not transfer straightforwardly between the sexes.

Prostate health: PSA, prostatitis and cancer

Concern that cycling might elevate prostate-specific antigen (PSA) and confound prostate cancer screening has been examined directly. A systematic review and meta-analysis found no significant overall change in PSA attributable to cycling, although the authors noted the small number of trials, modest sample sizes and absence of randomized data [23]. On current evidence, routine cycling does not appear to produce clinically meaningful PSA elevation.

The reassuring pooled estimate nonetheless conceals meaningful variation at the level of individual studies. Although the meta-analytic mean change in PSA was negligible, some component studies recorded acute post-ride elevations of up to roughly threefold, against a

background of very small samples – a median of only about forty subjects per study [23]. The practical implication is narrow but useful: a PSA sample drawn in the hours immediately after a long ride may be transiently and misleadingly raised, even though habitual cycling does not appear to shift baseline values.

The question of prostate cancer is less settled. A single large cross-sectional study reported a graded increase in self-reported prostate cancer with greater weekly cycling time among men over 50 years of age, while finding no association with ED or infertility [20]. This isolated signal warrants caution: it derives from self-report within one cross-sectional cohort, cannot establish causation and has not been corroborated. Long-term riding has also been weakly linked to prostate symptoms in men [18]. Taken together, the prostate evidence is reassuring with respect to PSA but inconclusive regarding cancer risk, and is repeatedly identified as a priority for future research [5].

Where the prostate-cancer signal appeared, it was steep. In the single cohort that reported it, men over fifty had between roughly threefold and sixfold higher odds of self-reported prostate cancer across ascending categories of weekly cycling time [20]. The size of that gradient is what makes the finding difficult to dismiss outright, even as its self-reported, cross-sectional and uncorroborated nature makes it impossible to accept as causal – a tension that explains why prostate cancer is so consistently nominated as the field’s priority for future work.

Genitourinary trauma and scrotal pathology

Distinct from the overuse and compression phenomena above is acute genitourinary trauma from crashes. Analysis of a national trauma database found that genitourinary injuries occurred in about 2% of bicycle-related trauma cases; the kidney was the most commonly injured organ, followed by the bladder and urethra and then the penis and scrotum, with young men principally affected [24]. Notably, vertebral fractures frequently accompanied bladder, urethral or renal injury, which is a clinically useful association for clinicians assessing injured cyclists [24].

The distribution of these injuries is clinically instructive. Renal trauma accounted for about three-quarters of genitourinary injuries, with the bladder and urethra and then the penis and scrotum making up the remainder, and operative management ranged from scrotorrhaphy in a substantial minority of cases to occasional nephrectomy. Genitourinary injury also tended to travel in company: a vertebral fracture accompanied roughly a third of cases and a pelvic fracture a quarter, and among riders who sustained a vertebral fracture a concomitant bladder-urethral or renal injury was present in around 38% and 23% respectively – a pattern that should lower the threshold for genitourinary imaging in any crashed cyclist with spinal injury [24].

Off-road riding carries its own pattern of pathology. Ultrasound comparison of mountain bikers with on-road cyclists found abnormal scrotal findings in the large majority of mountain bikers versus roughly half of road cyclists, including scrotoliths, spermatoceles and epididymal calcifications, attributed to the repetitive high-impact vibration of off-road terrain [25]. The clinical significance of these largely asymptomatic findings is uncertain, but they mark mountain biking as a higher-risk discipline for scrotal abnormality.

Quantified, the off-road excess is stark: abnormal scrotal ultrasound was found in 94% of mountain bikers against 48% of on-road cyclists, with scrotoliths (81% versus 16%), spermatoceles (46% versus 26%) and epididymal calcifications (40% versus 12%) all markedly more frequent off-road, in a group whose mean age was only about twenty-five [25]. The high prevalence in young, otherwise healthy men reinforces the case for regarding mountain biking as a distinct exposure rather than a more vigorous version of road cycling.

Perineal and pelvic pain, pudendal neuropathy and saddle sores

The compression mechanism described above finds its clearest clinical expression in pudendal neuropathy. Entrapment or compression of the pudendal nerve produces sharp pain along its course together with genital numbness and, in men, erectile difficulty; affected riders are prone to relapse [13]. Early warning symptoms such as penile or perineal pain, tingling or numbness, should prompt attention. Most cases respond to conservative management and to modification of posture and equipment rather than to invasive treatment, although the underlying evidence base remains of modest quality [13].

Saddle sores and related genitoperineal complaints (skin irritation, abrasions, fissures, nodules, swelling and numbness) are presumed common in both sexes but remain under-represented and under-researched, with treatment options poorly evidenced and many riders reluctant to disclose them. This tendency to suffer in silence, noted particularly among women, is itself a barrier to timely care [26].

A review of pelvic floor symptoms in female cyclists similarly described pain, tenderness, neuropathy, urological dysfunction and skin lesions, and observed that broader, conventionally shaped saddles were associated with fewer symptoms than some cut-out designs, while emphasizing the generally low quality of the available studies [27]. Across the pain literature the recurring themes are consistent: symptoms are common, frequently under-reported, and closely tied to posture and the saddle interface.

Prevention and equipment-based strategies

Because perineal loading is mechanically mediated, much of it is potentially modifiable. A systematic review and meta-analysis of strategies in healthy men found that no-nose saddles and recumbent bicycles significantly reduced perineal pressure and improved penile oxygen pressure relative to standard saddles, and that periodically standing on the pedals offers indirect benefit; no-nose saddles were endorsed despite a trade-off in stability and an increase in posterior seat pressure [15].

In women the optimal saddle design is debated. Pressure-mapping in competitive female cyclists found that, counter-intuitively, cut-out and narrower saddles were associated with higher perineal pressures than traditional or wider saddles, suggesting that cut-outs do not uniformly protect the pelvic floor [16]. A randomized comparison of a geometric saddle against a traditional professional saddle showed substantially better preserved vaginal tissue oxygenation during riding and markedly improved sexual-distress scores after six months of use, indicating that saddle geometry can meaningfully influence perineal perfusion and sexual wellbeing in women [28].

The magnitude of some of these effects is considerable. In the randomised geometric-saddle trial, vaginal transcutaneous oxygen pressure fell by about 30 mmHg on a traditional saddle after riding but by only around 10 mmHg on the redesigned saddle, and mean Female Sexual Distress Scale scores fell from roughly 41 to 12 over six months of use [28]. Conversely, cut-out saddles raised mean and peak perineal pressures by several kilopascals relative to traditional designs, although no corresponding effect on pudendal sensory thresholds was demonstrable in cross-sectional testing [16] – a reminder that pressure mapping and measured nerve function do not always move together.

Several rider-level factors recur across the symptom literature as protective. Adjusting the handlebar level with or above the saddle is associated with lower odds of genital numbness and saddle sores [9]; higher handlebar height with less numbness in both sexes [9,22]; regular use of padded shorts with less numbness [10]; and spending more than a fifth of riding time standing with reduced numbness [9]. Collectively these point to a coherent, low-cost prevention package: an appropriate saddle, a relatively higher handlebar, padded shorts, a sound bike fit and frequent changes of position.

Conclusions

Cycling delivers substantial cardiovascular, metabolic and public-health benefits, and for most riders these clearly outweigh its urogenital risks [2,5]. The evidence does not support a simple

causal link between recreational cycling and erectile dysfunction or infertility [11,17,20], and routine riding does not appear to elevate PSA [23]. At the same time, the literature consistently identifies a cluster of predominantly compression-related complaints: genital numbness, saddle sores, perineal and pudendal pain, urethral stricture in men, more frequent UTIs and vulvar symptoms in women, and scrotal abnormalities in mountain bikers. Those complaints rise with riding volume and intensity [9,10,25].

The reassuring counterpart to these risks is that perineal loading is largely mechanical and therefore modifiable. Saddle design and width, handlebar height, padded shorts, sound bike fit and intermittent standing each demonstrably reduce perineal pressure or symptoms [15,16,28]. A recurring limitation across the field is the under-representation of women and the reliance on cross-sectional, self-reported data using heterogeneous instruments, alongside unresolved questions such as the prostate cancer signal [5,26].

For sports medicine practitioners the practical implications are clear. Urogenital symptoms in cyclists should be actively asked about rather than waited for, given riders' reluctance to disclose them; persistent genital numbness or perineal pain should prompt review of saddle, position and training load before it progresses to neuropathy; mountain bikers presenting with scrotal findings, and crash victims with vertebral fractures, warrant targeted genitourinary assessment; and prevention should be framed as routine, low-cost bike-fit and equipment optimization rather than as a reason to discourage cycling. Future research should prioritize longitudinal designs, validated and sex-specific outcome measures, and the long-term questions of prostate risk and female pelvic health.

Disclosure

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During the preparation of this work, the authors used Anthropic's Claude Opus 4.8 for the purpose of editorial assistance, including language editing, improving clarity and conciseness, and minor stylistic revisions. After using these tools, the authors reviewed and edited the content as needed and take full responsibility for the substantive content of the publication.

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