ORIGINAL RESEARCH—ERECTILE DYSFUNCTION

Cutting Off the Nose to Save the Penis

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ABSTRACT

Introduction. The average bicycle police officer spends 24 hours a week on his bicycle and previous studies have shown riding a bicycle with a traditional (nosed) saddle has been associated with urogenital paresthesia and sexual dysfunction.
Aim. The objective of this study was to assess the effectiveness of the no-nose bicycle saddle as an ergonomic intervention and their acceptance among male bicycle police officers.
Methods. Bicycle police officers from five U.S. metropolitan areas were recruited for this study. Officers completed: (i) the International Index of Erectile Function Questionnaire (IIEF); (ii) computerized pressure measurements at the points of contact on the bicycle; the handlebars, the pedals, and the saddle; (iii) one night of nocturnal Rigiscan® assessment; (iv) penile vibrotactile sensitivity threshold assessed by computerized biothesiometery. Officers selected a no-nose saddle for their bicycles and were asked to use the intervention saddle exclusively for 6 months, at which point they were retested.
Main Outcome Measures. Perineal pressure, urogenital numbness, penile vibrotactile sensitivity threshold, erectile function as measure by International Index of Erectile Function Questionnaire (IIEF) and Rigiscan.
Results. After 6 months, 90 men were reassessed. Only three men had returned to a traditional saddle. The results are presented for those who used the no-nose saddle continuously for 6 months. There was a 66% reduction in saddle contact pressure in the perineal region ($P < 0.001$). There was a significant improvement in penis tactile sensation ($P = 0.015$). There was a significant improvement in erectile function assessed by IIEF ($P = 0.015$). There were no changes noted in the Rigiscan® measures. The number of men indicating they had not experienced urogential paresthesia while cycling for the preceding 6 months, rose from 27% to 82% using no-nose saddles.
Conclusions. (i) With few exceptions, bicycle police officers were able to effectively use no-nose saddles in their police work. (ii) Use of no-nose saddles reduced most perineal pressure. (iii) Penile health improved after 6 month using no-nose saddles as measured by biothesiometry and IIEF. There was no improvement in Rigiscan® measure after 6 months of using no nose saddles, suggesting that a longer recovery time may be needed. **Schrader SM, Breitenstein MJ, and Lowe BD. Cutting off the nose to save the penis. J Sex Med 2008;5:1932–1940.**

Key Words. Bicycle; Bike; Saddle; Seat; Biothesiometry; Penis; Erectile Dysfunction; Rigiscan; IIEF

Introduction

Much of the biomedical community has reached a consensus about the association between erectile dysfunction and bicycle saddles [1,2] and yet this association is often rejected in popular press bicycling magazines and Internet blogs. The etiology of this condition has been linked to both nerve entrapment [3–6] and vascular occlusion [7–10] In 2002, we reported the effects of bicycling on nocturnal erections in bicycle police officers [11]. One of our recommendations to the police officers was to consider a bicycle saddle without a protruding nose (no-nose saddles; often referred to as noseless saddles) [12,13]. Studies have shown that no-nose saddles result in significantly less restriction in penile blood flow compared to traditional saddles [7,14] and saddles with cutouts or splits [15]. Police officers expressed three concerns about using no-nose saddles. First there was a concern that more pressure would be exerted on the hands of a cyclist using a no-nose saddle causing hand or wrist problems. Lowe et al [16] reported that perineal pressure was reduced without a significant increase in hand pressure in police and public safety bicycling officers while using no-nose saddles compared to a traditional nosed saddle. Another police officer concern was the possibility of blunt trauma injuries without the saddle nose holding him away from the bicycle top-tube bar. Many police officers expressed a concern about bicycle handling using no-nose saddles and thus whether no-nose saddles could be used in the duties of bicycle officers. In the present study no-nose saddles were provided to bicycle police officers to evaluate their effectiveness as an ergonomic intervention to alleviate the pernineal pressure, urogenital numbness, penile sensation, decreased penile erectile function, and collected data on the potential groin injuries due to sliding off the no-nose saddle. Results of this intervention study are reported here.

Materials and Methods

The study protocol was reviewed and approved by the Human Subjects Review Board at the Centers for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health, prior to the initiation of the study.

Study Recruitment

The study was conducted in five major U.S. metropolitan areas recruiting a total of 121 bicycling police officers. During the first site visit to each location, a brief overview of the study, including the rationale and goals, was presented to each shift of bicycle patrol officers during their normal roll call or daily briefing. The men then, in private, decided whether or not to participate. Study participants signed informed consent forms and were enrolled into the study.

Testing Procedures

Each enrolled officer completed a work and health questionnaire which included the International Index of Erectile Function Questionnaire (IIEF) [17].

Saddle pressure was measured for each officer riding his duty bicycle using his pre-study (nosed) saddle. Using a custom-fabricated pressure sensing mat (Pliance, Novel Electronics, St. Paul, MN) contact pressure between the cyclist and saddle was characterized over each saddle as a whole and over a spatial region of each saddle corresponding to the cyclist's perineum. Saddle pressure was measured for 3–5 minutes of road cycling and 30 seconds in a stationary seated position while leaning against a wall or other solid object for balance. The road cycling measurements were taken with the officers using the data logger fit into a small backpack in order for the officer to cycle in his normal riding conditions. This cycling intensity was intended to simulate a typical patrol "cruising" intensity. The pressure-sensing mat was constructed with 234 sensors (a 16×16 matrix with tapered corners) of $1.875\ \text{cm} \times 1.875\ \text{cm}$ dimensions. Based on previous work (Lowe et al.) [16] our approach assumes that the ischial tuberosities, or descending ischial rami, correspond to the two local maxima that are observed in the saddle pressure profile. We infer that the perineal region of the cyclist lies in the region anterior to these pressure maxima and is relatively narrow in width. The perineal region is identified along the centerline of the segment running perpendicularly, midway between the clearly identifiable pressure maxima under the ischia. The spatial resolution for the calculation of pressure in this region is limited by the sensor system (square sensors of 1.875 cm width). We chose a width of three sensors (5.625 cm) over which to calculate this regional pressure. The length of this segment runs to the front of the sensor mat. Pressure in this perineal region is calculated by averaging the pressure levels of all sensors registering non-zero pressure. Our belief is that, currently, no feasible technology or protocol exists, for a moving cyclist, to discriminate and remove all pressure created by the inner/posterior regions of the thigh from the derivation of a measure of contact pressure affecting the soft tissues of the perineum [16]. Recent works by Sauer et al. [18] and Bressel et al. [10], using optical motion capture and magnetic resonance imagery (MRI), respectively, have spatially referenced the location of the distribution of saddle pressure with respect to anatomic structures of the pelvis and within the urogenital tract. However, these innovative approaches are obviously infeasible in a road cycling situation as was the present study.

Hand and foot force were calculated based on pressure measured with the Novel Pedar foot insole sensors. The left insole was worn in the subject's shoe in its intended use and the right foot insole was wrapped around the grip area of the left handlebar under the subject's hand. These foot insole sensors were of the standard Novel design and have been described in previous work [16].

Average hand and foot force were calculated for the period of cycling and the period of static sitting on the saddle by averaging the total insole force in each frame (sampling interval) of the trial. Total insole force was calculated by multiplying each individual sensor pressure by the area of the sensor and summing over all sensors on the insole. As in our previous study, we have made the assumption that the left and right hand and foot create contact forces on the bicycle that are symmetric and have thus doubled both values to represent the total foot force and total hand force on the bicycle.

The Rigiscan® Plus (Timm Medical Technologies, Eden Prairie, MN) was used to assess erectile function during the normal sleep patterns of the participants [19,20]. It is a computerized monitor worn on the leg, with two loops encircling the penis, one on the base the other on the tip, used to study the penis during sleep. Men have penile erections during sleep which provide useful physiologic information on erectile capability [21]. For reliable results the participants were asked not to ejaculate for 1 day before the test, not to drink coffee, tea, caffeinated soft drinks, or alcoholic beverages for 2 hours before bedtime, and not to take sedatives, tranquilizers, muscle relaxants, or sleeping pills the night of the test—all these have been linked with impaired sexual function. A brief self administered questionnaire was completed after Rigiscan® Plus use. These questions were used to verify compliance to these pre-conditions and gathered information on the number of hours biking the previous day and the quality of their sleep. The variable number of sleep time erections, measured by the Rigiscan® Plus, is an assessment of the physiological ability to have a nocturnal erection. The variable percentage of sleep time an erection occurred is an indicator of erection quality. It is noted that Rigiscan measurements do not necessarily correlate with axial rigidity [22] and no measures of axial rigidity were evaluated in this study.

Vibrotactile sensitivity thresholds of the finger and penis were conducted using a computerized biothesiometer (Neuro Sensory Analyzer VSA-3000, Medoc Ltd, Israel) according to the manufacturer's instructions. Briefly, a clean sterile trough was placed on the vibratory probe. Two type of stimuli scenarios were tested—first stimuli increase in intensity until a sensation is perceived, at which moment the stimulus is halted by the subject pressing a button. Then the vibratory stimulus is started at 12 microns and decreases. The subject presses the button when he can no longer perceive vibration. This was repeated three times. A reaction time artifact is built into this computerized measurement, due to the time lapse between the moment a sufficient energy has been administered to the stimulation site to eventually induce a sensation until the data reaches the brain, is processed, and a message is conducted to the signaling hand to press the switch. The biothesiometer was set up in a private restroom. The computer operator was in an adjoining room. The index finger of the left hand was first tested under supervision from the investigator. The finger was primarily tested to familiarize the participant with the study procedure with direct interaction with the investigator before the private testing of the penis. The testing of the finger also provided a gross overview of changes in hand numbness. The investigator then left the restroom and the door to the adjoining room was closed. The study participant adjusted the trough height and angle and put his penis into the trough (Figure 1). The computer operator spoke loud enough to be heard through the door while testing.

Following these baseline measurements, no-nose saddles were provided to all of the study participants. The officers selected no-nose saddles for their duty bicycles and for their personal bicycles and were asked to use only no-nosed saddles for 6 months. They were allowed to try different no-nose saddles to determine which was most comfortable. Bicycle fit adjustments for all saddles were made according to local police department fit guidelines. If during the 6 months their saddle needed replacement, a new one was provided to them.

After 6 months, a second site visit was conducted at each study location. Each officer again

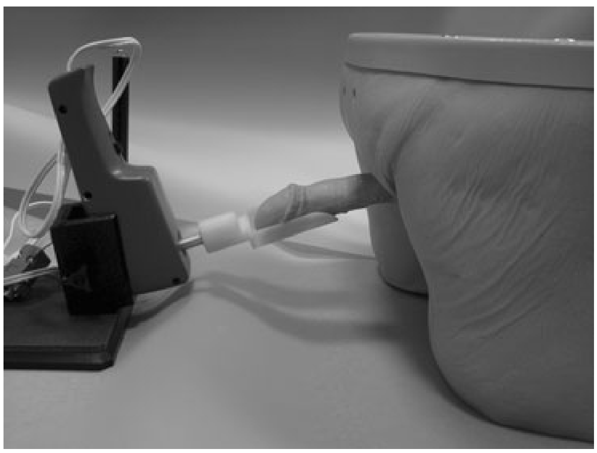

Figure 1 The model depicts the penis placement for biothesiometer measurements.

completed a work and health questionnaire which included the IIEF questionnaire, bicycle saddle pressure assessment, Rigiscan® Plus testing, and biothesiometry.

Results

Across the five metropolitan areas, 121 bicycle police officers were recruited, 17 of these did not return for their 6-month evaluation and their status on the use of no-nose saddles is unknown. An additional 14 left the bicycle patrol during the 6-month study period. Of the remaining 90 participants, only three had returned to their traditional saddles by the end of the study period. Due to the complexity of conducting a multi-site study tracking and evaluating participants for 6 months and the malfunction of some equipment, varying number of participants completed both the pre- and posttests. The sample size (N) for each test is provided. Each man was compared with his original data while using a traditional (nosed) saddle and after using the no-nose saddle for 6 months using a paired *t*-test. Table 1 summarizes the results of the study. The average participant was 37 years old and had been riding in the bike patrol for 3 years. The average participant weighed approximately 215 lbs wearing his police gear. The average officer was actually on the bicycle about 24 hours per week (22.8 hours pre-; 25.4 hours post-; $P = 0.19$). Two officers reported they were being treated for hypertension throughout the study, six men indicated they were smokers throughout the study, and no other officers reported medical risk factors for erectile dysfunction.

Of the 85 participants answering the question, none experienced a blunt trauma to the groin area while using a no-nose saddle.

When compared to the same man using his original traditional (nosed) saddle perineal pressure was significantly reduced ($P < 0.0001$) using a no-nose saddle, both while riding the bicycle and while sitting stationary leaning against a wall. As an example, pressure distributions of the same officer using his traditional nosed saddle and his no-nose saddle are presented in Figure 2.

Of the 77 men answering both the pre- and post-numbness question, 73% of the officers indicated that they experienced numbness to the buttocks, scrotum or penis while using traditional saddles at the beginning of the study. After using no-nose saddles for 6 months, only 18% indicated that they now experienced such numbness (Figure 3).

After using no-nose saddles for 6 months, significant improvement ($P = 0.015$) was noted in erectile function when evaluated by the IIEF questionnaire from the beginning of the study (nosed-saddle) to the end of the study (no-nose saddle). Because a majority of men score a perfect 30 on this questionnaire, Dinsmore et al. [23] used the percent of men scoring a 30 in the control group to compare to the treatment group. These data indicated that 86.1% of men in their control group (N = 109, age range 31–86) scored a 30 on the IIEF erectile function domain. In the current study 72.7% bicycle police officers scored a 30 while using the traditional saddles and this percentage rose to 84.9% after using no-nose saddles for 6 months (Figure 4). This observed change is of little or no clinical diagnostic value but illustrates a population shift. Evaluating both the significant change in the average score of the IIEF and the percentage of perfect scores demonstrates the overall improvement in reported erectile quality from these men.

Table 1 Summary Statistics from Bicycle Police Officers after Using Traditional (Nosed) and No-Nosed Saddles

	N	Traditional saddle Mean (SD)	No-nose saddle Mean (SD)	*P*
Age (years)	86	37.6 (5.7)		
Bike patrol (Years)	82	3.0 (2.6)		
Biking/week (hours)	82	22.8 (11.5)	25.4 (13.2)	0.190
Weight (lbs)	61	214.6 (29.7)	215.7 (30.4)	0.359
Perineal pressure (kPA)	73	20.4 (8.9)	7.0 (3.2)	<0.0001
Total hand force (N)	46	264.0 (147.2)	337.2 (170.7)	0.030
Total foot force (N)	26	163.1 (122.1)	184.6 (115.9)	0.518
Total combined hand/foot (N)	26	411.4 (212.1)	523.7 (242.3)	0.082
International Index of Erectile Function Questionnaire score	67	29.12 (2.4)	29.61 (1.35)	0.015
Finger biothesiometry (microns)	64	1.40 (0.62)	1.29 (0.51)	0.086
Penis biothesiometry (microns)	64	2.02 (0.84)	1.80 (0.75)	0.015
Number of erections	70	4.36 (1.67)	4.21 (2.13)	0.543
Erection duration (mins)	70	24.00 (12.17)	24.14 (11.58)	0.920
Never numb (%)	78	27.3	81.8	

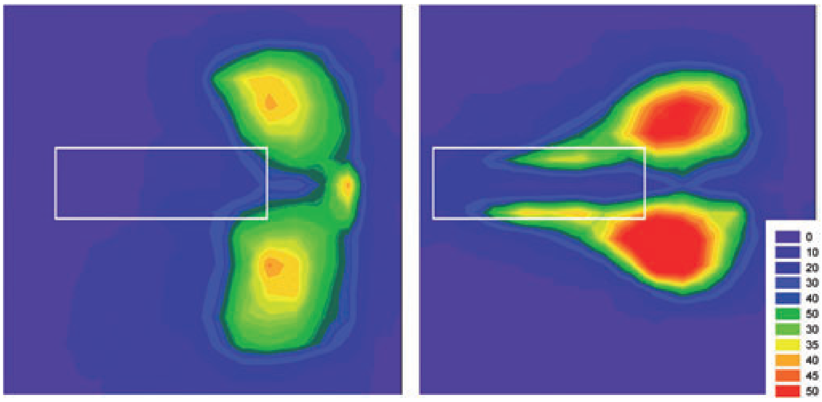

Figure 2 Pressure distribution for an individual police officer after six months of use of a no-nose saddle (left) and his original traditional saddle six months prior (right). The rectangular box shows the approximate region in which perineal pressure was calculated. The average pressure in this region was calculated for the sensors registering non-zero pressure within this area, not necessarily over the entire area. Pressure units are kPa.

A significant improvement ($P = 0.015$) was observed in the vibrotactile sensitivity threshold of the penis from the baseline measurements to the measurements made after 6 months of use of the no-nose saddle as measured by biothesiometry.

After using the no-nose saddles for 6 months, no changes were observed in the number of nocturnal erections ($P = 0.54$) or the duration of time men were erect in their sleep ($P = 0.92$) over the baseline measurements. The average number of

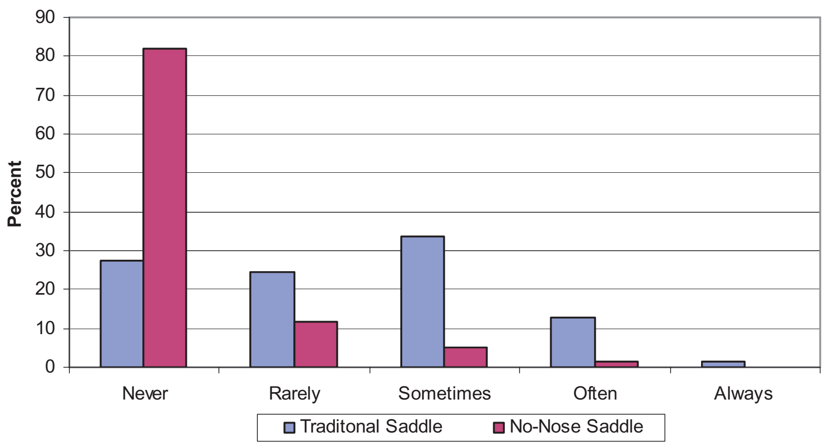

Figure 3 This graphs presents the percentage of men, who answer the question that selected each choice in response to the question "During the past six months, did you feel numbness in your buttocks, scrotum (testicles), or penis during or after riding a bicycle?" Traditional Saddle—The response of the men at the beginning of the study while using their saddles. No-Nose Saddle—The response of the men after using the no-nose saddle for 6 months.

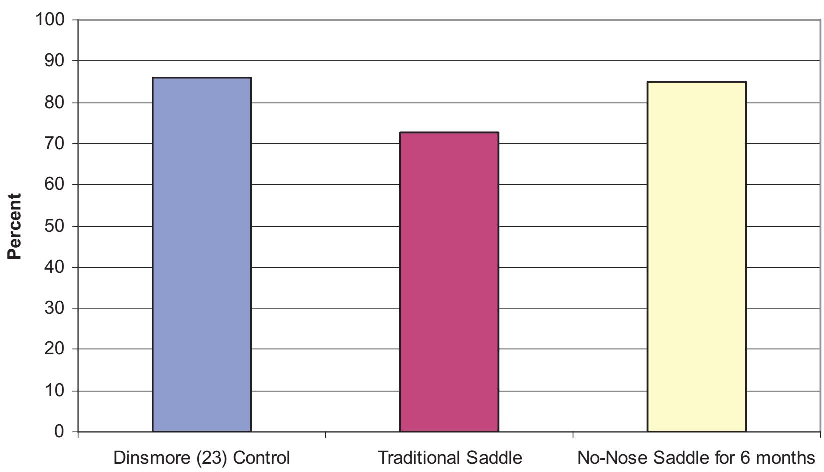

Figure 4 The graph presents the percentage of men getting a score (maximum value) in the International Index of Erectile Function Questionnaire questions for erectile function as described by Dinsmore et al. [23].

erections for both the beginning and end tests was four and the average duration of erectile activity was 24%.

There appears to be a slight but nonstatistically significant improvement ($P = 0.086$) in the sensitivity of the finger as measured by biothesiometry (the vibration test). It is apparent that the sensitivity of the finger was not harmed while using a no-nose saddle for 6 months.

Discussion

With the well documented association between the perineal pressure from the bicycle saddle and erectile function [1], the need for an ergonomic intervention that would alleviate the compression of the perineal area resulting from the nosed bicycle saddle during police patrol cycling became evident [2]. Cohen [24] provides a brief history of the bicycle in his recent book on bicycle fit. The bicycle saddle as the name implies was a modification of the horse saddle cut away for the free movement of the legs to pedal. Since the 1880s, there have been several adaptations to make the bicycle saddle comfortable. These include the addition of springs, foam, and cutting away parts of the nose. One of the obvious discomforts of traditional bicycle saddles was the male rider was sitting on his internal penis and the female rider was sitting on her external genitalia. To alleviate this discomfort the midline of the saddle nose was cutout. While these saddles improved comfort in both men [24] and women [25], it was soon discovered that pressure to the pudental nerves and vessels was not alleviated [26,27], blood flow (pO_2) continued to be disrupted [7,15], and there was a negative impact on sexual function [12]. Saddles without a protruding nose appeared to be a logical intervention [2]. These saddles reduce perineal pressure substantially [16] and research indicates that blood flow to the penis is minimally affected [7]. More than a dozen different no-nose bicycle saddles are manufactured and yet this design has been slow to be accepted in the recreational and sport cycling community. There has been a reluctance to use no-nose saddles; however it is not clear whether this reluctance is due to the handling and stability issues of the bicycle [24] or merely a reluctance to accept change in the appearance of the saddle and cycling feel [2].

The current study did not have a control population as each man served as his own control. A concurrent control population would have been an informative addition to this study; however, none of the officers agreeing to be study participants were willing to continue to use their current saddle. Each study participant wanted to take advantage of trying the no-nose saddles.

In this study, penile health improved after using no-nose saddles for 6 months as assessed by IIEF and biothesiometry. However, there was no change in the Rigiscan® data after using no-nose saddles for 6 months. This then raises the question of whether there was a deficit in the duration of erectile activity as measured by Rigican® as we reported earlier [11] and there was no improvement over the 6 months or whether there was never a deficit to begin with. The data presented in this study (four erections with erectile activity of 24%) are very similar to our published data on other bicycle police officers [11] (four erections with erectile activity of 27%) which are lower than that report's non-biking comparison group having four erections with 43% duration of erectile activity. This previous report indicated that the number of erections was not affected by cycling but the duration of the erections was reduced. In the present study, the 6-month study period might not have been long enough to see an improvement in the Rigiscan® measures or these outcomes may have been permanently altered. Furthers studies are needed to address this issue.

The pressure measured in the perineal region in the present study was substantially lower than that reported in the 2004 study [16]—for both the traditional (nosed) and no-nose saddle. The perineal pressure measured on the no-nose saddles was approximately 18 kPa in the 2004 study and 7.0 kPa in the present study. Much of this difference may be due to the fact that in the present study, participants had 6 months of use of the no-nose saddle to make adjustments and develop a positioning on the bicycle that more effectively transferred weight distribution away from the perineal region and on to the ischial bones. Participants in the 2004 study had no experience in using or adjusting a no-nose saddle, and were given no instruction on optimal saddle height adjustment when they were presented with this saddle on the ergometer. However, in both the 2004 cross-sectional and the present prospective longitudinal study, the pressure recorded in the region corresponding to the cyclist's perineum associated with the no-nosed saddle was one half or less than that associated with the traditional (nosed) saddle.

With numerous saddles without a protruding nose commercially available, the no-nosed saddle appears to be a viable solution yet there has been resistance to adoption among bicyclists including bicycle police officers. The resistance is based on several concerns as described in the introduction. A secondary objective of our work has been to address these concerns.

The first concern was that the no-nose saddle might result in a tendency to shift the distribution of the cyclists' weight from the saddle to the handlebars. The Lowe et al. study published in 2004 [16] indicated that, under controlled conditions on a stationary cycle ergometer, the no-nose saddles did not appear to increase the distribution of load to the points of contact at the hand/handlebar, or feet/pedal interface. A similar assessment was incorporated into the present study as a secondary objective, in which the interface pressures on one hand and one foot were recorded synchronously with saddle pressure. These pressure values were converted to an equivalent normal force on the sensor and a measure of total hand and foot force calculated from individual sensor pressure readings multiplied by sensor area. The present data indicated that the no-nose saddle resulted in a significantly higher load at the hands when converted from the pressure measurements in this manner. This finding is contradictory to that reported in the cross-sectional study [16], in which the no-nose saddle was associated with no greater hand or foot load than a traditional (nosed) racing or sport saddle.

Data from the present study and Lowe et al. [16], presented as force on the hand and foot, do not represent the vertical load-bearing forces at these interfaces between the cyclist and bicycle. The measure of total hand force includes some component of gripping force as the pressure sensor nearly encircles the handlebar grip region and the pressure readings are converted to an equivalent normal force on each sensor. Using the pressure mapping technology, we are unable to separate the gripping force component of this total hand contact force from the contact load-bearing component. Since the present study involved road cycling on pavement with turns and bike handling, and a much greater need for bike stability than the 2004 study in which the ergometer was self-standing, differences in hand force between the no-nose and traditional saddle may become more prominent as bike stability becomes more relevant. Similarly, the average pedal force is influenced by the cadence and pedaling resistance which were highly controlled on the cycling ergometer in the 2004 study and largely uncontrolled in the present study in which police officers were asked to pedal in a parking lot at their typical "beat patrol" intensity. Thus, the measures of hand or foot load are difficult to compare between the 2004 and 2007 studies. Furthermore, the 2004 study tested all participants and saddles on the same cycle ergometer set-up with a consistent pedal and handlebar design. In the present study, officers were tested riding their individual bicycles for which the pedal and handlebar designs varied. The grip area design of the handlebars (shape and contour, surface area, and padding characteristics) will have a large effect on the measurement of contact pressure on the hands.

We are aware of one other study [28] relating to the effect of no-nose saddles on the distribution of load or pressure supported by the hands. Their study reported a 13% increase in normalized electromyographic (EMG) activity in the triceps associated with the use of a no-nose saddle—an indicator that more of the cyclist's body weight may have been supported at the handlebars when using this saddle. However, the Bressel and Larson study [28] examined only a single no-nose saddle and their procedure set the no-nose saddle height at the same level as the traditional (nosed) saddle. Manufacturers of these saddles have recommended to us that a lower saddle height should be adopted with these saddles and our belief is that traditional bike fit guidelines and practices, having been established for the nosed saddle, may not result in an optimum bike fit with no-nose saddle designs.

Given the conflicting results of Bressel and Larson [28], Lowe et al. [16], and the present data, our belief is that, at present, there is insufficient evidence to implicate the no-nose saddle for increasing load and localized pressure on the hands to a degree suggestive of increased risk for problems in the hands such as the "cyclists palsy" or other neuropathies described in the literature [29,30,31]. However, more research is needed to ascertain if and how traditional bike fit guidelines and practices should be modified to accommodate no-nose saddles. Our obvious recommendation is that cyclists who experience symptoms of numbness, tingling, etc. in the hands should seek immediate remedy—whether they use a traditional nosed or no-nose saddle.

A related concern with the no-nose saddle has been that of an increased likelihood of a cyclist sliding forward off the saddle causing blunt trauma to the groin from the top tube of the bicycle. None of 85 police officers in this study who used the no-nose saddle for 6 months reported slipping off of the no-nose saddle causing blunt trauma to the groin. Lastly, there was the concern that the bicycle police officer could not do police work which required both high and slow speed cycling, cycling on both roads and rough terrain, and maneuvers such as going down stairs. Yet only three officers in our study reported returning to a traditional saddle during the 6-month study. Two of the these officers requested a replacement no-nose saddle when we returned to do the 6-month assessment indicating their no-nose saddles had broken. A police officer's assessment of using a no-nose saddle published in the International Police Mountain Bike Association Newsletter indicates the acceptance of no-nose saddles by some police officers [32].

Recent data presented by Bressel and Nuckles [33] reported similar perineal pressures (22.7 kPa) in cyclists using a traditional racing saddle. That study indicated that the perineal pressure must be reduced by 60% (to approximately 7 kPa) to remove compression to the corpus spongiosum and corpora cavernosa of the cyclist measured using MRI. In the current study the average pressure levels in the perineal region associated with the no-nose saddles were 7 kPa.

While this study evaluated male cyclists, a recent study of female cyclists indicated that there is a decrease in genital sensation compared to female runners [34]. It is hypothesized that these findings are the result of the pressure of the saddle nose on the female genitalia; therefore, the no-nose saddle may be a good intervention for female cyclists as well.

Conclusions

The most important question is whether the use of no-nose saddles is healthier to the rider than traditional saddles. This study clearly confirms that perineal pressure is significantly reduced when using no-nose saddle. The documentation of better blood flow to the penis [7,14], the improvement in erectile function as assessed in this study using IIEF, and the 10% improvement in penile sensation in this study indicate that no-nose saddles are better for penile health than traditional bicycle saddles.

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Conflict of Interest: The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the National Institute for Occupational Safety and Health.

Mention of company names and/or products does not constitute endorsement by the National Institute for Occupational Safety and Health/Centers for Disease Control and Prevention.

Statement of Authorship

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(b) Acquisition of Data
Steven M. Schrader; Michael J. Breitenstein; Brian D. Lowe

(c) Analysis and Interpretation of Data
Steven M. Schrader; Michael J. Breitenstein; Brian D. Lowe

Category 2

(a) Drafting the Article
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(b) Revising It for Intellectual Content
Steven M. Schrader; Michael J. Breitenstein; Brian D. Lowe

Category 3

(b) Final Approval of the Completed Article
Steven M. Schrader; Michael J. Breitenstein; Brian D. Lowe

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