

## The Extent of Incurred Pelvic Floor Damage during a Vaginal Birth and Pelvic Floor Complaints

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### Abstract

**Background:** Pelvic floor damage through vaginal birth exists in approximately half the women postpartum. Through this damage, complaints like urinary incontinence, faecal incontinence, flatus, pelvic organ prolapse, dyspareunia and pain in the pelvic floor area whilst sitting may occur. However, these complaints are also seen in women who do not encounter pelvic floor damage after childbirth, and in women who never experienced childbirth.

**Aim:** The purpose of this study was to examine how far the extent of pelvic floor damage during a vaginal birth is responsible for the development of pelvic floor complaints. Findings could help improve information for pregnant women, stimulate preventative measures before and at the time of birth and provide better-tailored care postpartum.

**Methods:** This study was set up in a cross sectional design in The Netherlands. 379 women filled out an online questionnaire. 239 women between the ages of 18 and 45 met the inclusion criteria. 177 parous women who had a vaginal birth in the past two years and 62 nulliparous women were divided in five groups: no childbirth (control group), no reported damage, episiotomy, 1<sup>st</sup> and 2<sup>nd</sup> degree, and 3<sup>rd</sup> and 4<sup>th</sup> degree perineal laceration. Six pelvic floor complaints were investigated: urinary incontinence, faecal incontinence, flatus, pelvic organ prolapse, dyspareunia and pain in the pelvic floor area whilst sitting were subject of this study. It was expected that more severe pelvic floor damage would result in more or more severe pelvic floor complaints. Hypotheses were tested using multivariate analyses of variance, followed by contrast analysis.

**Results:** Only dyspareunia occurs significantly more often after vaginal birth with 3<sup>rd</sup> and 4<sup>th</sup> degree perineal laceration in comparison with the control group. No significant differences between the five groups were found on urinary incontinence, faecal incontinence, pelvic organ prolapse and pain in the pelvic floor area whilst sitting.

**Conclusion:** Dyspareunia is most likely to occur after vaginal birth with 3<sup>rd</sup> and 4<sup>th</sup> degree perineal lacerations.

**Keywords:** Childbirth; Episiotomy; Pelvic floor complaints; 1<sup>st</sup> and 2<sup>nd</sup> degree perineal laceration; 3<sup>rd</sup> and 4<sup>th</sup> degree perineal laceration

### Introduction

Pelvic physical therapists are trained to treat somatic problems in parous and nulliparous women. They are often confronted with women with incurred pelvic floor problems after a vaginal birth. During their treatment the centre of attention and focus of intervention is mainly focused on regaining control over pelvic floor muscle function, to diminish pelvic floor complaints in relation to lost pelvic floor muscle function [1]. Pelvic floor muscles are meant to support our organs, in women the bladder, uterus and rectum, and to prevent urinary and faecal incontinence [1,2]. Pelvic floor muscles also help to make it possible to urinate, defecate, have sex and give birth by relaxation [2,3]. Vaginal childbirth jeopardizes pelvic floor muscle function and often induces pelvic floor complaints [1,4-11].

About half of the Dutch parous women report a variety of pelvic floor problems after a vaginal birth and in many cases the delivery itself is believed to be the cause of these problems [6]. Shame about incurred complaints, pressure of daily activities and care for the newborn baby often prevent women to seek help, even in situations

where the effect of childbirth on quality of life in social, physical and emotional respect is enormous [12,13]

During labour, going through a vaginal birth, the pelvic floor muscles are pushed open due to the contractions. These contractions and the pressure on the pelvic floor muscles can result in damage to the muscles. This damage often contains more than damage to the perineum or anal sphincter alone, which was believed to be the case for a long period of time [6]. The severity of the damage increases when perineal lacerations occur. A perineal laceration can have several different degrees. In case of a 3<sup>rd</sup> and 4<sup>th</sup> degree perineal laceration, the anal sphincter is damaged [14]. During vacuum assisted birth and in order to prevent 3<sup>rd</sup> and 4<sup>th</sup> degree perineal lacerations an episiotomy is done to keep the anal sphincter intact to prevent more serious damage to the pelvic floor muscles [15].

In about 20%-50% of women pelvic floor damage through vaginal birth results in pelvic floor complaints, such as physical discomfort or pain in the pelvic floor area whilst sitting, urinary or faecal incontinence, flatus, pain during sexual intercourse, called dyspareunia and pelvic organ prolapse [2,6,16-19]. Previous research confirms that 30%-60% of women suffer from dyspareunia in the first six months after childbirth [19,20]. Pelvic organ prolapse exists in many women

after vaginal birth, diminishing spontaneously in many women during the first year postpartum [21]. In premenopausal women the prevalence of pelvic organ prolapse in combination with urinary incontinence is approximately 33% [22]. So, one in three women in the age group of the respondents participating in this survey may suffer from pelvic organ prolapse and urinary incontinence regardless of vaginal childbirth. Previous studies on anal incontinence, a combination of faecal incontinence and flatus in women after an episiotomy, show a definite relation between the extent of the incurred pelvic floor damage during vaginal birth and these complaints [23]. Faecal incontinence appears to be experienced in approximately one in five women [22]. Episiotomies in comparison with lacerations do not protect women from obtaining complaints like flatus or faecal incontinence postpartum [24]. Normally, parous women with 3<sup>rd</sup> and 4<sup>th</sup> degree perineal lacerations have a higher risk to suffer from flatus [25].

Besides these potential physical consequences, childbirth induces more changes in women, such as physiological, hormonal changes due to the pregnancy itself and the breastfeeding of the baby, and these changes can also affect sexual functioning [19,26-29]. Psychologically, uncomplicated childbirths tend to increase self-confidence by positive, powerful experiences and complicated childbirths tend to reduce self-confidence, due to the medical assistance given at the time of birth and a sense of loss of control [30]. Literature study shows that it is possible that psychological complaints, such as for example a post-partum depression are a factor in relation to post-partum pelvic floor complaints [16].

Connective tissue structure and hypermobility alone form a risk factor for urinary incontinence and prolapse [5]. Age at childbirth, length of the birth and contractions, medical assistance in the form of a drip with hormones to induce labour, spontaneous vaginal birth or vacuum assisted birth, the birth weight of the baby (over 8 pounds) and the BMI of the mother are all risk factors for pelvic floor damage in case of a vaginal birth [31,32]. It is despite all these factors a challenging task for pelvic physiotherapists to help women deal with their complaints and regain control over their pelvic floor muscle function.

The experiences of treating parous and nulliparous women with pelvic floor complaints in pelvic physiotherapy practice raised the question if it would be possible to predict which pelvic floor complaints follow a specific extent of pelvic floor damage through vaginal birth. If this is the case then it might be possible to better inform women before labour and develop preventive treatment and adequate care after childbirth. It may also be possible to stimulate more women to seek help for their potential problems. If this is not the case, there must be a different or complementary explanation for the onset of pelvic floor complaints after childbirth.

**Therefore the following research questions are to be answered:**

- Are there differences in pelvic floor complaints between parous and nulliparous women?
- Do parous women with different extents of incurred pelvic floor damage due to vaginal birth experience different pelvic floor complaints than nulliparous women?
- Is it possible to predict certain complaints in relation to impact of childbirth?

## Materials and Methods

### Design

This study was set up in a cross sectional design, using a random open online survey to collect data.

**Respondents:** Respondents were not necessarily attending pelvic physical therapy practice and were Dutch inhabitants. A call for respondents was made, by a link to the questionnaire on a pelvic physiotherapy practice website and was spread on social media, focusing on women. An online questionnaire was used, taking into consideration the intimate character of the included questions and that online questionnaires are less likely to be filled out with social desirable answers [33]. Parous women that had had a vaginal birth in the past two years and were between the age of 18 and 45-years-old were included to form the target group. Nulliparous women in the same age group formed the control group.

### Procedure

This research project was assessed for the need for medical ethical approval adopted by the Open University of the Netherlands and approved [34]. The fact that respondents only had to fill out an online questionnaire, without undergoing any physical testing or behavioural change did not qualify this study for further ethical testing.

Some general demographic questions about age, relationships, amount of vaginal births and sexual orientation were asked as well as questions about the extent of pelvic floor damage through a recent vaginal birth and presence of pelvic floor complaints. The online questionnaire was available for a year between March 2015 and March 2016. An introduction letter contained an explanation of the questionnaire and provided information about the analyses of the data. Respondents took part on an anonymous and voluntary basis according to all laws and regulations applicable for Dutch scientific research. Furthermore, participants were informed that some questions were of an intimate nature and that they could quit the survey at any time. If participants approved of all this, they gave their informed consent by clicking on the "I accept" button and were linked to the questions. All participants were thanked for cooperating and received a debriefing immediately after finishing filling out the questionnaire. The in online entered data were automatically saved in an Excel sheet.

### Measurements

In this study self-constructed inventory questions were used about pelvic floor complaints, childbirth and in the case of childbirth, the extent of pelvic floor damage. So, the choices in answers were: 1. no childbirth, 2. no reported damage after childbirth, 3. episiotomy, rupture, 4. meaning 1<sup>st</sup> and 2<sup>nd</sup> degree perineal lacerations and (sub) total rupture, 5. meaning 3<sup>rd</sup> and 4<sup>th</sup> degree perineal lacerations. Six typical pelvic floor complaints (PFC) based on findings from literature study and experience from pelvic physiotherapy practice were formulated. These involved the presence of urinary incontinence (UI), faecal incontinence (FI), flatus (FL), pelvic organ prolapse (POP), dyspareunia (DP) and pain in the pelvic floor area whilst sitting (PPS). The six questions were scored on a 4-point scale rating the severity of the complaints as: 0. no problems at all, 1. problems once a month, 2. problems once a week and 3. daily problems.

### Data analysis

Data analysis was done in SPSS, version 24. Respondents were excluded for age under 18, being male, missing scores on having children, birth that was not vaginal, missing scores on the extent of incurred pelvic floor damage and or pelvic floor complaints. Hypotheses were tested using multivariate analyses of variance (MANOVA). The significance level used is  $p < 0.05$ . Significant multivariate effects were followed by contrast analyses. Age and the number of vaginal births were added as covariates.

### Results

A total of 379 women filled out the questionnaire in reaction to our online call for respondents of which 239 met the inclusion criteria. Power analysis for F-tests, MANOVA (special effects and interactions) conducted a priori indicated a sample size of at least 119 respondents, bases on five groups, five predictors and six response variables in order to get meaningful results. The effect size of this calculation was .06.

The control group was formed by 62 nulliparous women (mean age 29.21 years (SD=6.22)). The target group, parous women with a child under the age of two-years-old that was born through vaginal birth consisted of 177 women (mean age 31.24 years (SD=4.54)). With regard to this group, 88 women had one child, 63 women had two children, 20 women had three children and 6 women had four children. Furthermore, 35 women in the target group reported no damage after vaginal birth, 48 women reported an episiotomy, and 77 women reported 1<sup>st</sup> and 2<sup>nd</sup> degree perineal lacerations and 17 women reported 3<sup>rd</sup> and 4<sup>th</sup> degree perineal lacerations. A total of 95 women out of the target group reported positive on one of the six pelvic floor complaints questions. Out of the control group, 33 women reported positive on one of the six pelvic floor complaints questions.

As can be seen in Table 1, meaningful correlations were observed amongst the majority of the scores on the pelvic floor complaints questions. The strongest correlation is found between urinary incontinence and pelvic organ prolapse ( $r=0.33$ ).

	UI	FI	FL	POP	DP	PPS
UI						
FI	0.19**					
FL	0.08	0.26***				
POP	0.33***	0.24***	0.19**			
DP	0.24***	0.23***	0.05	0.09		
PPS	0.23***	0.08	0.18*	0.22**	0.19**	

**Table 1:** Inter-item correlations of Pelvic Floor Complaints (Note. N=239, \* $p < 0.05$ , \*\* $p < 0.005$ , \*\*\* $p < 0.001$ , UI=Urinary incontinence, FI=Faecal incontinence, FL=Flatus, POP=Pelvic organ prolapse, DP=Dyspareunia, PPS=Pain in the pelvic floor area whilst sitting).

The multivariate analysis did show a significant overall result, Pillai's Trace=0.20, (F=2.04, df=(24.920),  $p=0.002$ ), indicating a difference in the level of reported pelvic floor complaints between the five groups. The univariate F tests showed a significant difference for the five groups on flatus and dyspareunia (Table 2). With regard to the covariates age and number of vaginal births, the univariate F tests showed a significant effect for age on flatus (F=9.06, df=(1,227),

$p=0.003$ ). For number of vaginal births a significant effect was found on pelvic organ prolapse (F=4.26, df=(1,227),  $p=0.040$ ).

	1	2	3	4	5	F
PFC	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	
UI	0.19 (.54)	0.20 (.53)	0.49 (.91)	0.48 (.77)	0.65 (.86)	2.02
FI	0.03 (.18)	0.00 (.00)	0.00 (.00)	0.00 (.00)	0.06 (.24)	1.6
FL	0.68 (1.07)	0.14 (.55)	0.36 (.84)	0.21 (.41)	0.65 (1.00)	3.40*
POP	0.02 (.13)	0.00 (.00)	0.23 (.72)	0.21 (.74)	0.18 (.73)	1.64
DP	0.29 (.58)	0.26 (.66)	0.31 (.65)	0.27 (.64)	0.88 (.93)	3.68*
PPS	0.00 (.00)	0.49 (1.01)	0.57 (1.03)	0.42 (.85)	0.59 (1.06)	1.61

**Table 2:** The extent of incurred pelvic floor damage during vaginal birth ((Means and MANOVA-results) Note: N=239, \* $p < 0.05$ , 1=No childbirth, 2=No reported damage after childbirth, 3=Episiotomy, 4=Rupture, meaning 1<sup>st</sup> and 2<sup>nd</sup> degree perineal lacerations, 5=(Sub) Total rupture, meaning 3<sup>rd</sup> and 4<sup>th</sup> Degree perineal lacerations, PFC=Pelvic floor complaints, UI=Urinary incontinence, FI=Faecal incontinence, FL=Flatus, POP=Pelvic organ prolapse, DP=Dyspareunia, PPS=Pain in the pelvic floor area whilst sitting).

Contrast analyses, simple contrasts (first) showed a significant difference for flatus between nulliparous women in the control group and parous women in the group 'no damage' ( $p=0.01$ ), the group 'episiotomy' ( $p=0.04$ ) and the group 'rupture' ( $p=0.00$ ). A significant difference was found for dyspareunia between the nulliparous women in the control group and parous women in the group '(sub) total rupture' ( $p=0.00$ ). In the current research group nulliparous women suffer significantly more often from flatus than parous women without damage, an episiotomy or a 1<sup>st</sup> and 2<sup>nd</sup> degree perineal laceration. Furthermore, only after a 3<sup>rd</sup> and 4<sup>th</sup> degree perineal laceration parous women suffer significantly more from dyspareunia than nulliparous women.

### Discussion

Only dyspareunia occurred significantly more often in parous women after vaginal birth with 3<sup>rd</sup> and 4<sup>th</sup> degree perineal laceration in comparison with the control group of nulliparous women. For urinary incontinence, faecal incontinence, flatus, pelvic organ prolapse and pain in the pelvic floor area whilst sitting no significant main effects were found between the five groups. With these results this study contributes to more evidence for the prevalence of dyspareunia postpartum, also gently indicating it to be more prevalent after specific sort of damage, such as 3<sup>rd</sup> or 4<sup>th</sup> degree perineal lacerations.

This study also shows pelvic organ prolapse not to be more prevalent in parous women in comparison to nulliparous women. The previously mentioned spontaneously diminishing aspect of pelvic organ prolapse in the first year after childbirth could be the reason why no significant relation was found between the extent of incurred pelvic floor damage and pelvic organ prolapse. The fact that pelvic organ prolapse also exists in nulliparous women, making this complaint not necessarily a specific resultant of pelvic floor damage through childbirth. The significant inter-item correlations between pelvic organ

prolapse and urinary incontinence in this study support the prevalence of this combination of complaints, but do not specifically link them to pelvic floor damage through vaginal birth. Urinary incontinence tends to increase with more severe impact, but is not found significant in relation to pelvic floor damage through vaginal birth.

Knowing that approximately one in five women experience faecal incontinence, the outcome on this specific complaint in our study is surprisingly low. In the current research group flatus occurred more often in nulliparous women than in parous women after vaginal birth with no reported damage, an episiotomy or a 1<sup>st</sup> and 2<sup>nd</sup> degree perineal laceration. For nulliparous women in comparison with the parous women who had a 3<sup>rd</sup> and 4<sup>th</sup> degree perineal laceration no significant difference on flatus was found. This is contrary to findings in previous studies. The remarkable high prevalence of flatus in nulliparous women in this study raises questions. Previous studies report no significant difference in flatus between parous and nulliparous women [35]. No literature was found to explain the high prevalence of flatus in nulliparous women. More research is needed to be able to give a satisfactory explanation for this remarkable finding.

It may well be that the somatic questions without calculating other risk factors for pelvic floor complaints do not cover the full implications of the effects of a vaginal birth. In possible follow-up studies more research and careful thought will have to be put in the construction of a more internally consistent inventory list of questions on pelvic floor complaints after vaginal birth. In this study the explicit choice was made to examine the effect of the extent of pelvic floor damage through vaginal birth on just the most prevalent pelvic floor complaints mentioned in already published research to see if a prediction could be made of which complaints could be expected after a specific sort of pelvic floor damage through vaginal birth.

If this study is to be followed up, another factor to consider is measuring the extent of the damage to the pelvic floor muscles more adequately by performing a physical examination to determine hidden perineal damage post-partum [36,37]. The fact that this study has been done as an anonymous online survey made it impossible to perform a physical examination on the respondents. The extent and severity of the results of pelvic floor damage post-partum could also be examined more specific by using validated questionnaires on urinary and faecal incontinence, flatus, pelvic organ prolapse, pain and dyspareunia.

Childbirth, according to the results in this study, does not seem to be the only factor responsible for incurring pelvic floor complaints, even though there is some careful prediction possible from physical damage through childbirth on pelvic floor complaints. This raises questions as to why nulliparous women suffer pelvic floor complaints and which other variables play a role in the prevalence of pelvic floor complaints in parous and nulliparous women. Do sexual and psychological aspects have any relation with pelvic floor complaints?

## Conclusion

Dyspareunia is most likely to occur after vaginal birth with 3<sup>rd</sup> and 4<sup>th</sup> degree perineal lacerations. With this finding this study contributes to more evidence for the prevalence of dyspareunia postpartum. In future studies it will be interesting to find more evidence for specific pelvic floor complaints in relation to specific damage to the pelvic floor muscles. This could possibly lead to better-tailored care for pregnant women at the time of birth and pre- and postpartum. Professionals working with pregnant women and women post-partum could be better informed about the effect of the extent of pelvic floor damage

through vaginal birth and consequent pelvic floor complaints, so they can offer preventative advice and pelvic floor muscle training. Preventative actions may contribute to a better quality of life in physical, emotional, sexual and psychological respect pre- and postpartum. Also partners could be better informed about the most frequent complaints and consequences after vaginal birth to make these more communicable and understood. More insight in the role of possible sexual and psychological consequences of childbirth may add to better care for women suffering from pelvic floor complaints.

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## Conflict of Interest

The authors report no conflict of interest and there was no financial support for this research.

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