

FEMALE SEXUAL FUNCTIONING AND PREGNANCY.

*A study into the effects of pregnancy and perineal trauma
on female sexual function and doctors' attitudes towards it.*

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2 Abstract.

Sexual function is an important part of human life and plays a significant role in quality of life. Pregnancy and the effects of mode of delivery and perineal trauma sustained have a fundamental impact on physical, emotional and mental health, all of which play a role in sexual functioning. The topic of female sexual function during and after pregnancy is generally not given sufficient attention by doctors.

This thesis looks at the effect that pregnancy has on female sexual function using the female sexual function index (FSFI), a validated, self-reported questionnaire in a prospective cohort study. The results of these questionnaires were compared in each of the three trimesters of pregnancy and analysed. Another prospective cohort study was performed looking at the FSFI scores for postnatal women who had sustained varying degrees of perineal trauma. These women were assessed at three and six months postnatally and their results compared. Doctors were also questioned on their approaches to discussing and managing female sexual function during the antenatal and postnatal periods.

This thesis found that pregnancy had a negative impact on female sexual function, with the third trimester having the most significant impact. Sexual function improved between three and six months postnatally. Women suffering from more extensive degrees of perineal trauma were more likely to take longer to resume sexual activity. Doctors were found not to be routinely discussing sexual function with their patients.

This thesis shows the significant impact that pregnancy and perineal trauma have on female sexual function and that fact that this is a largely neglected topic by the medical profession.

3 Introduction and Literature Review.

3.1 Introduction.

This chapter will examine the background history of female sexual function as a topic of medical research and look at the current definitions in use for assessing female sexual dysfunction. It will provide a summary of the current literature available on female sexual function in relation to pregnancy.

The chapter will be divided into:

- A literature review of studies looking at the effect that pregnancy has on female sexual function.
- A literature review of studies looking at the factors influencing postnatal female sexual function.
- A literature review of studies looking at how well doctors address the topics of female sexual function in pregnancy and the postnatal period.

3.2 Background.

Female sexual function remains an under-investigated and somewhat neglected topic in medical research¹. This is even more pertinent when placed in the context of its status in pregnancy and the post-natal period. A wide range of prevalence rates of sexual dysfunction in women have been cited depending on which diagnostic tools and cut off values are used². Prevalence rates of female sexual function are typically in the region of 40%, with 12% of women suffering from significant distress and a reduced quality of life as a direct result of it^{3,4}. Studies have found that there is a strong association between female sexual dysfunction (FSD) and decreased physical and emotional well-being as well as reduced overall life satisfaction⁵. Although FSD and the impact it has on quality of life is becoming increasingly recognised, the effect that pregnancy and mode

of delivery can have on female sexual function is still relatively under-researched. There appears to be both a lack of adequate assessment of the problem by health professionals as well as a reluctance amongst women themselves to seek help regarding sexual complaints. Previous studies have found only around 15% of women with sexual dysfunction actually discuss this topic with a health care professional^{6, 7}.

The place of FSD in medical research is still relatively new with the first documented studies on sexual function and dysfunction only starting in the 1960s. William H. Masters and Virginia E. Johnson⁸ published the landmark piece “Human Sexual Response” in 1966. They pioneered research into the mechanism of the human sexual response cycle and wrote on both the diagnosis and treatment of sexual disorders. Their work proposed the concept of the human sexual response cycle, consisting of four phases: excitement, plateau, orgasm and resolution. This linear description of the sexual response is now felt to be outdated and although may be relevant when discussing male sexual function, does not adequately describe female sexual function⁴. More recently, psychological influences such as emotional intimacy and sexual desire have also been incorporated into the explanation of sexual arousal, which has further highlighted some of the differences between male and female sexual function⁹. Rosemary Basson modified the original Masters and Johnson sexual cycle to better reflect female sexual function. Her work meant that additional psychological factors, that are now considered to be very crucial factors, were for the first time included as part of the response pattern¹⁰. In her paper “The Female Sexual Response: A Different Model” which was published in the *Journal of Sex and Marital Therapy* in 2000 she changed the traditional model of the sexual response. She replaced the straight line from desire to arousal to plateau to orgasm with a cyclical concept of overlapping phases influenced by mental and physical factors as well¹¹. Basson also commented in 2007 that the topic of sexuality still doesn't get the attention it should in healthcare, saying “Most of my colleagues have the same complaint. The area seems not to have any priority, it's underfunded”⁶.

When psychological and biological influences are included as major influencers in sexual functioning it becomes increasingly apparent that pregnancy, which undeniably has extensive and very unique physical and psychological ramifications, is likely to have a very significant impact on female sexual function and is therefore a topic that urgently needs to be addressed.

“There is a dearth of scientifically reliable data about the impact of childbirth on female sexual function and the association with the different modes of delivery.”¹² This was a description of the situation by Jha and Thaker in their paper in the *European Journal of Obstetrics & Gynaecology and Reproductive Biology* in 2010, and it is fair to say that the situation has not changed significantly since then.

This thesis aims to provide more information on this under researched topic.

3.3 Definitions.

In order to begin to address the sizeable topic that is FSD we must first look at what constitutes “normal” sexual function. The World Health Organization defines sexual health as “the integration of somatic, emotional, intellectual, and social aspects in ways that are positively enriching and that will enhance personality, communication, and love”¹³. FSD has been defined as a disorder of sexual desire, arousal, orgasm or sexual pain that results in significant personal distress¹⁴.

The most recent definitions of FSD by the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-V) classifies FSD into three main groups as seen in Table 1. Classification of Female Sexual Dysfunction (FSD)- DSM V. (below). Where the DSM-V differs from the previous DSM- IV is that arousal disorders and hypoactive sexual desire disorders are now grouped together into one category and dyspareunia and vaginismus as also now placed into a category together.

Table 1. Classification of Female Sexual Dysfunction (FSD)- DSM V.

Category	Includes
Female sexual interest/ arousal disorder.	Female hypoactive sexual desire disorder. Female arousal disorder.
Female orgasmic disorder.	Female orgasmic disorder.
Genito- pelvic pain/penetration disorder.	Dyspareunia. Vaginismus.

In sexual interest/arousal disorder there is a lack of response to stimuli and either completely absent, or diminished sexual thoughts, fantasies or desires. The lack of interest is deemed to be beyond the normal changes that occur within life cycle changes and relationship duration. Sexual arousal disorders are further divided into three groups. Firstly, there is subjective sexual arousal disorder. In this category there is the absence, or significant decrease, in feelings of sexual arousal from sexual stimulation. In this category the physiological responses (e.g. vaginal lubrication) still occur, whereas in genital sexual arousal disorder, the second category, there is absent or impaired genital arousal, such as minimal vulval swelling or vaginal lubrication. In genital sexual arousal disorder the subject does still however experience sexual interest and desire from non-genital stimuli. The third group is combined genital and subjective arousal disorder and is both of the aforementioned conditions occurring together.

Orgasmic disorder refers to either a lack of orgasm, marked diminished intensity of orgasms or marked delay of orgasms in the presence of normal or high sexual arousal.

Sexual pain disorder is divided into vaginismus and dyspareunia. Vaginismus is persistent or recurrent difficulty in allowing entry of a penis, finger or any other object into the vagina, despite the woman's expressed wish to do so. There may be associated involuntary pelvic muscle contraction. Dyspareunia refers to recurrent or persistent pain with vaginal intercourse and it can be further

subclassified into superficial or deep depending on the location of pain experienced.

Based on the DSM- V the problems experienced need to occur 75%-100% of the time over a six month time frame to make any diagnosis of sexual disorder, with the notable exception of substance or medication-induced disorders.

3.4 Female sexual function and pregnancy.

Pregnancy is usually a time of reduced sexual activity¹⁵. There are significant physical, hormonal and emotional changes that occur as a result of pregnancy and these vary and progress with increasing gestation. There are often fears that sexual intercourse during pregnancy could cause potential harm to the mother or the unborn baby such as bleeding, infection, damage to the growing fetus, rupture of the membranes or even induction of labour¹⁶. Some studies have suggested that the effect of pregnancy on sexual function differs between multiparous and primiparous women, with a more significant change being seen in the latter group¹⁷. The first pregnancy is likely to be accompanied by more pronounced psychological changes as well as higher anxiety levels and more significant adjustments in body image as these changes and adaptations will not have been previously experienced.

3.4.1 Anatomical Changes.

In order to explain the variations in sexual function during pregnancy it is important to remember the physiological and anatomical modifications that the female body undergoes during this period. All organs of the body are affected by pregnancy to some degree and many of these changes and adaptations result in symptoms experienced by the woman.

Nausea and vomiting are very common complaints in pregnancy, affecting 50–90% of pregnancies¹⁸, especially in the first trimester. As pregnancy progresses,

mechanical changes in the alimentary tract also occur. There is displacement of the stomach due to the increasing size of the growing fetus. The oesophageal sphincter tone is decreased, and changes in oestrogen and progesterone levels result in structural alterations in the gastrointestinal tract and together these predispose the woman to symptoms of reflux¹⁹.

One of the earliest changes seen is peripheral vasodilatation which results in a decrease in systemic vascular resistance. This subsequently results in adaptive changes in the cardiovascular and renal systems²⁰. There are also musculoskeletal changes that are observed in pregnancy, such as joint laxity in the anterior and longitudinal ligaments of the lumbar spine and widening and increased mobility of the sacroiliac joints and pubic symphysis²¹. Diaphragmatic elevation in late pregnancy which along with anaemia can predispose to a sensation of breathlessness²¹. Skin changes can result in pigmentation and stretch marks²².

The relevance of all of these changes is that they impact on general well-being of the women and can often contribute therefore, to a decrease in interest in sexual activity²³. There are the also the changes that are more directly linked to sexual function such as increased breast tenderness as well the most obvious increase in abdominal girth.

The psychological impact of such dramatic physical changes must also be remembered as this will also affect sexual function. Studies looking at women in their third trimester suggested that satisfaction with body image and body image self-consciousness were related to sexual satisfaction²³⁻²⁵.

3.4.2 Pelvic floor dysfunction.

Rogers et al²⁶ investigated pelvic floor function in nulliparous pregnant women throughout the three trimesters. They assessed the women using the Incontinence Severity Index (ISI), the Pelvic Floor Impact Questionnaire (PFIQ-7), the Wexner Faecal Incontinence Scale (WFIS), as well as asking questions regarding sexual activity and perineal pain. A Pelvic Organ Prolapse Quantification (POP-Q) exam was also performed. Besides an increase in genital hiatus and perineal

there was no change in any other of the POP-Q values during pregnancy. As pregnancy progressed, urinary incontinence (UI), Incontinence Impact Questionnaire (IIQ-7) and Faecal incontinence (FI) scores increased, signifying a worsening of symptoms. Perineal pain increased and sexual activity decreased as pregnancy progressed. We know that in the non-pregnant population that UI²⁷ and FI²⁸ result in poorer sexual functioning^{29,30} and this suggests that the decline in sexual activity may be in fact related to secondary symptoms that develop from pregnancy rather than any anatomical changes that occur.

3.4.3 Fears Surrounding Sexual Activity During Pregnancy.

It is often reported that women and their partners are concerned that sexual activity should be avoided in pregnancy due to it resulting in potentially negative health effects. Fok et al³¹ performed a prospective cross-sectional study which looked at 298 pregnant women in Hong Kong. Pregnant women completed a self-administered questionnaire anonymously. They found that 93% of women reported an overall reduction in their sexual activities during pregnancy. 60% of women were found to have a reduction in sexual desire and enjoyment during pregnancy. Over 80% of the women and their partners worried about the adverse effects that sexual activity could have on the developing fetus. They also found that over one third of women stopped vaginal intercourse entirely during pregnancy. This was however a cross-sectional study and so comparisons between the trimesters of pregnancy were made between different women thus slightly reducing the validity of conclusions that can be drawn regarding the changes in sexual function across the three trimesters.

In support of the argument that fear of harm to the growing fetus is a factor in reducing sexual activity in pregnancy Corbacioglu et al³² looked into the factors affecting frequency of intercourse and sexual desire in the first trimester. They looked at 130 healthy, married pregnant women between the 4th and 10th week of gestation and asked them to complete a self-administered questionnaire and the Female Sexual Function Index (FSFI)³³. They found that women who had been unaware of their pregnancy had significantly higher frequency of sexual activity compared to those who were aware ($p=0.002$). The total FSFI score

gives a numerical value where the lower the value, the higher the degree of sexual dysfunction. The total score was 21.99 ± 8.13 in the aware group and 24.66 ± 3.76 in the unaware group ($p=0.02$). Those aware of their pregnancy also had reduced arousal, lubrication, orgasm and satisfaction scores. It is also possible that in general those who were unaware of their pregnancy were at earlier gestations and so they would likely have fewer symptoms (which could negatively impact on their well-being and interest in sexual activity) from the pregnancy. Bartellas et al³⁴ also showed that 49% of women worried that sexual intercourse may harm the pregnancy and that these concerns centered around fears that sexual activity could cause preterm labour or premature rupture of membranes.

3.4.4 Women's Expectations of Sexual Function in Pregnancy.

It is important to also consider what women's beliefs and expectations around sexual functioning in pregnancy are. In Iran, Mahnaz et al³⁵ found that the administration of a structured educational package of sexual education, in the form of written information and verbal advice, to women in the antenatal clinic led to a reduction in sexual dysfunction rates. Afshar et al³⁶ also found that women who were given sex education lectures as well as educational booklets in the first trimester, had better sexual functioning than those who were not. This suggests that having a good knowledge of and positive attitudes towards the physical and psychologic changes that occur during pregnancy are important factors in preventing female sexual dysfunction.

There are not many studies that have been done looking at women's expectations of sexual function in pregnancy. A Swedish study³⁷ looking at women's concerns during pregnancy used the Cambridge Worry Scale and found that few women were worried about the effect of the pregnancy on their relationship. In a small study of 26 women in Austria the perceived 'importance of sexuality' and 'importance of sexual intercourse' for women, decreased in pregnancy³⁸.

3.4.5 Female sexual dysfunction in the second trimester.

A study by Vannier et al¹⁵ looked at 261 multiparous and nulliparous pregnant women using several online self-reported questionnaires, including the FSFI and the Female Sexual Distress Scale (FSDS)³⁹. They found that 42% of women met the clinical cut-off for sexual distress (as determined previously in validation studies for the questionnaires). They found that 88.1% of women were sexually active and of those women, 26% reported concurrent sexual problems and distress and 14% reported sexual distress in the absence of sexual problems. There was an improvement in sexual function noted in the second trimester compared to the first trimester. This study again has limitations due to the fact it is cross-sectional and includes both multiparous and primiparous women.

This relative improvement in sexual function during the second trimester was also replicated in studies done in Turkey by Küçükdurmaz et al²⁸. They again performed a cross sectional study looking at 207 multiparous and primiparous pregnant women using the FSFI. Rates of sexual dysfunction were higher in the first (87%) and third (92.6%) trimesters when compared to the second (80.6%) trimester, although not statistically significant ($p=0.243$). Overall the rates of sexual dysfunction are much higher in this study than in other studies mentioned, possibly due to the different population and cultural differences. It has been postulated that this improvement seen in the middle trimester may be related to the abating of some of the physical symptoms experienced early on in pregnancy, such as nausea as well as an improvement in self-confidence related to some adaptation to the physical changes⁴⁰.

Hanafy et al⁴¹ found that rates of FSD were also decreased in the second trimester (51%) compared to the first (68%) and third (72%) trimesters. They reported that scores for the sexual desire component of the FSFI decreased in the first trimester, were variable in the second trimester and decreased again in the third trimester.

Erol et al¹⁴ also saw an improvement, albeit a much smaller one, in the second trimester. They did a cross-sectional study of both multiparous and primiparous women, 116 women in the first trimester, 220 in the second and 253 in the third.

They reported total FSFI scores of 21.4 in the first trimester, 22.3 in the second and 15.9 in the third trimester, which were statistically significant ($p < 0.05$). Fuchs et al⁴² also reported sexual activity to be highest in the second trimester in their prospective cohort study looking at 624 multiparous and primiparous women in Poland.

Ninivaggio et al³² however showed a decline in both sexual activity and sexual functioning with advancing gestation and therefore each trimester. They collected data from 124 women in the first trimester, 403 in the second trimester, and 96 in early third trimester. Rates of sexual activity were 94% in the first, 90% in the second and 77% in the third trimester ($p < 0.001$). Mean FSFI scores also decreased as pregnancy progressed; 26.5 ± 7.7 in the first, 25.6 ± 9.0 in the second and 21.5 ± 10.3 in the third trimester. Using the FSFI cut-off score for sexual dysfunction of 26.55, women in the third trimester were more likely to report dysfunction than those in the second trimester (57 % vs. 37 %, $p < 0.001$).

Bartellas et al⁴³ also found a progressive decline in sexual activity with advancing gestation. In the first trimester sexual activity was 96%, which fell to 89% in the second trimester and all the way down to 67% in the third trimester ($p < 0.001$).

Akpinar et al⁴³ agreed with this finding of decreasing FSFI score with increasing gestation in another cross-sectional study of multiparous and primiparous women. They investigated 103 women in the first trimester, 116 in the second and 146 in the third. As gravidity increased, the total FSFI score decreased ($r = -0.127$, $p = 0.016$).

3.4.6 The Third Trimester and Sexual Functioning.

Most studies agree that the third trimester is the time in pregnancy associated with the lowest frequency of sexual activity²⁸ and the highest frequency of sexual dysfunction⁴². As previously mentioned Erol et al³² found a very marked difference in the third trimester as compared to the first and second. The most common sexual dysfunction symptom was diminished clitoral sensation, observed in 94.2% of the patients, followed by lack of libido in 92.6% and

orgasmic disorder in 81%. It is clear that in the 3rd trimester the physical changes and the emotional fluctuations are greatest. There is also psychological stress and anxiety surrounding the upcoming delivery and the transition into motherhood for primiparous women.

Bartellas et al⁴⁴ showed that the concerns regarding sexual activity leading to preterm delivery or fears of inducing labour or provoking premature rupture of membranes increased as the pregnancy progressed. Concerns regarding premature labour and premature rupture of membranes were more frequent in each progressive trimester (9% and 5% in the first trimester, 21% and 11% in the second trimester and 49% and 37% in the third trimester; $p = 0.0008$ and $p = 0.001$ respectively).

Chang et al¹⁴ in Taiwan looked at 663 pregnant women using the International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form, The Body Image Scale for Pregnant Women, as well as a number of demographic and free- text questions. Their main outcome measures were urinary incontinence, body image, obstetric history, overall sexual function, intercourse/activity, satisfaction, and desire during pregnancy. They found that mean scores for overall sexual function, intercourse/activity, and satisfaction differed significantly among the three trimesters ($p < 0.02$), whereas mean scores for sexual desire did not. Mean scores for overall sexual function and intercourse were significantly lower during the third trimester than during the first trimester ($p < 0.001$) or second trimester ($p < 0.001$).

3.4.7 Does Parity Effect FSD in Pregnancy?

Akpınar et al⁴⁵ also found that as the parity of the pregnant women increased, the total FSFI score decreased $r = -0.113$, $p = 0.013$. Fok et al¹⁵ reported that the difference between nulliparous and parous women was greater than between parous women and grand multiparous women. They found that it was nulliparity rather than increasing parity that was an independent factor associated with the reduction of vaginal intercourse ($p < 0.001$).

3.4.8 Sexual Satisfaction During Pregnancy.

Most studies report that decreasing sexual function and activity in both the pregnant and non-pregnant state is directly linked to decreased sexual satisfaction^{38,45,46}. Pauleta et al⁴⁰ however, who looked at 188 women, found that sexual satisfaction scores did not change in pregnancy compared with the pre-pregnancy state, despite an overall decline in sexual activity especially during the third trimester.

Hanafy et al⁴⁴ found that sexual satisfaction scores from the FSFI were at their lowest in the first trimester compared to the second and third (4.2 +/- 1.1, 4.8 +/- 0.8, 4.6 +/- 1.0 respectively). Chang et al⁴² in fact found that scores for satisfaction were significantly higher during the third trimester than during the first trimester ($p=0.01$) of pregnancy. This is the only study however to show an improvement in any scores in the third trimester.

Table 2. Summary of key studies looking at sexual function and pregnancy over the last 20 years.

Authors	Date	Population	Measurement Tools	Results	Comments
Bartellas et al ⁴⁷	2000	25 first trimester (T1) 71 second trimester (T2) 45 third trimester (T3) Multiparous and nulliparous women Canada	Self-reported questionnaire. Cross-sectional study.	Decrease in sexual activity T1=96%, T2=89%, T3=67%. 58% reported a decrease in sexual desire. 49% worried sexual intercourse may harm the pregnancy.	Cross-sectional. Includes multiparous and nulliparous women.
Fok et al ¹⁵	2005	298 women Nulliparous and multiparous women. China	Self-reported questionnaire. Cross-sectional cohort study.	93% reported an overall reduction in sexual activities. >60% women had reduction in sexual desire and enjoyment. >80% worried about the adverse effects of sexual activity on the fetus.	Cross-sectional. Includes multiparous and nulliparous women.

Aslan et al ²⁸	2005	40 women Nulliparous and multiparous women. Turkey	Self-reported questionnaire. Prospective cohort study.	Significant decline in all domain scores during pregnancy. Satisfaction and pain domains scores between first and second trimesters showed significant differences. All domain scores significantly decreased in the third trimester.	Small sample. Includes and nulliparous multiparous women.
Erol et al ⁴²	2007	116 T1 220 T2 253 T3 Nulliparous and multiparous women Turkey	Self-reported questionnaire. Cross- sectional observational study.	Total FSFI scores in T1= 21.4 ± 10.1, T2 =22.3 ± 10 and T3= 15.9 ± 12.3. 94.2% had diminished clitoral sensation, 92.6% had lack of libido in and 81% had orgasmic disorder. No correlation was detected scores and serum androgen levels.	Cross-sectional. Includes multiparous and nulliparous women.
Chang et al ⁴⁰	2011	663 women Multiparous and nulliparous women. Taiwan	Self-reported questionnaire. Cross- sectional observational study.	Scores for sexual desire did not change. Scores for overall sexual function and intercourse were significantly lower in T3 than compared to T1 (P=0.01).	Cross-sectional. Includes multiparous and nulliparous women.

Hanafy et al ⁴⁷	2014	300 married women, multiparous and nulliparous. Egypt	FSFI.	FSD rates: T1= 68%, T2= 51%, T3= 72%. Arousal, lubrication and orgasm scores significantly decreased in T3.	Multiparous and nulliparous. Married women only.
Küçükdurmaz et al. ¹⁵	2016	T1= 54 T2= 72 T3= 81 Nulliparous and multiparous. Turkey	FSFI Cross sectional	Sexual dysfunction rates: T1= 87%, T2= 80.6%, T3=92.6%. Most common concerns: fear of having pain (35%), risk of abortion (21.3%) and religious factors (10%).	Cross-sectional. Includes multiparous and nulliparous women.
Ninivaggio et al. ²⁸	2017	T1= 124 T2= 403 T3= 96 Nulliparous. USA	FSFI Cross-sectional, secondary analysis	Rates of sexual activity: T1 94 %, T2 90 %, T3 77 % Mean FSFI scores: T1 26.5 ± 7.7, T2 25.6 ± 9.0, T3 21.5 ± 10.3.	Cross-sectional.
Vannier et al. ⁴²	2017	261 women Multiparous and nulliparous. Canada	FSFI Cross-sectional.	42% met the clinical cut-off for sexual distress. 88% having sexual activity.	Cross-sectional. Includes multiparous and nulliparous women.

Akpinar et al. ⁴⁷	2018	T1= 103 T2= 116 T3- 146 Multiparous and nulliparous. Turkey	FSFI Cross-sectional.	As gravidity increased, total FSFI score decreased $r=-0.127$, $p=0.016$.	Cross-sectional. Includes multiparous and nulliparous women.
Fuchs et al. ⁴⁸	2019	624 women. Poland	FSFI Prospective cohort study	Mean scores for the overall sexual function T2= 25.9 ± 8.7 , T3= 22.7 ± 8.7 . Most sexual activity seen in 2 nd trimester.	Multiparous and nulliparous women.

3.4.9 Conclusions.

It can be seen from the above studies that sexual function does appear to be adversely affected by pregnancy but there remains a number of unanswered questions regarding the changes that occur at this time.

There is a lack of consensus over whether FSD increases in a linear fashion with increasing gestation, or whether there is a temporary improvement in sexual functioning during the second trimester. Many of the studies done on sexual function during pregnancy are cross-sectional and do not follow women throughout the pregnancy.

There is also a large variation in the reported amount of sexual activity occurring during pregnancy with reported rates being between 66% and 94%. Many of the trials that have been done to date are also hampered by issues such as not being prospective, including both nulliparous and multiparous women and not using validated questionnaires.

This thesis aims to assess the change in sexual function and activity during each trimester of pregnancy.

3.5 Sexual Functioning in the Postnatal Woman.

It is evident that the sexual functioning of a woman at any point of her life, but perhaps even more so after childbirth, is multifactorial and will depend upon a very wide range of factors. Studies suggest that around 90% of women resume sexual intercourse by three to four months postnatally²⁸. This figure, however, does not reflect the proportion of these women who, despite resuming intercourse, suffer from significant sexual problems. It has been reported that up to 83% of women experience sexual problems at three months after delivery, and by six months the figure is still 64%⁴⁹. When assessing FSD we must remember that there also remains a lack of consensus on what 'normal' postpartum sexual

health is. O'Malley et al⁴⁷ discuss the fact that studies to date use tools that are designed to assess sexual health in the non-pregnant state. These tools may not be appropriate for use during pregnancy given significant physical and psychological changes that will have occurred.

Sexual dysfunction in relation to mode of delivery has been studied, again with conflicting results. Some have shown no direct relation between mode of delivery and sexual dysfunction in the long term⁴⁸ but a significant impact in the short term⁴². However, not many similar studies have been carried out on the effect the degree of perineal injury at childbirth has on postnatal sexual function.

3.5.1 Sexual Dysfunction and Mode of Delivery.

There is conflicting evidence regarding the impact that mode of delivery has on postnatal sexual function. Barrett et al⁵⁰ looked at 484 primiparous women, 39 of whom had a caesarean section, the rest of whom had both instrumental and normal vaginal deliveries. They found that at three months postnatally the rates of dyspareunia were significantly related to the mode of delivery, with vaginal delivery being the single biggest risk factor. By six months however, this difference was no longer statistically significant. At three months 83% of women reported sexual problems and by six months this number had dropped to 64%. The values were still much higher than pre-pregnancy rates which were reported as being 38%. The percentage of women experiencing dyspareunia at three months postnatally was 62% for unassisted vaginal delivery, 78% for instrumental deliveries, 41% for caesarean sections in labour and 47% for caesarean sections outside of labour. By six months these figures had dropped to 30%, 37%, 28% and 21% respectively.

Hosseini et al⁵¹ studied 114 women having vaginal deliveries and 99 women having caesarean sections outside of labour and found no difference between FSFI scores in women having normal vaginal deliveries and those having had a caesarean section at six and twenty-four months postnatally.

Barbara et al⁵² looked at 45 primiparous women who had operative vaginal deliveries and compared them with 99 primiparous women who had caesarean sections. They found no difference between the two groups in terms of time of resumption of sexual activity. They did find that the operative vaginal delivery group suffered from poorer scores for arousal, lubrication, orgasm and global sexual functioning.

Brubaker et al⁵³ looked at 407 women who had sustained OASI, 390 who had had a vaginal delivery without an OASI and 124 who had elective caesarean sections. They found that women who had an elective caesarean section had a lower rate of resumption of sexual activity at six months postpartum than women who had a vaginal delivery without damage to the anal sphincter complex, 86% versus 94% respectively. Those women with an OASI had a sexual activity rate of 88%.

McDonald et al⁵⁴ did a prospective cohort study of 1244 nulliparous women in Australia and followed them up to 18 months postnatally. 24% of all women reported dyspareunia at 18 months postnatal. Compared with women who had a spontaneous vaginal delivery with an intact perineum or un-sutured tear, women who had an emergency caesarean section (adjusted odds ratio [aOR] 2.41, 95% confidence interval [95% CI] 1.4-4.0; P = 0.001), vacuum extraction (aOR 2.28, 95% CI 1.3-4.1; P = 0.005) or elective caesarean section (aOR 1.71, 95% CI 0.9-3.2; P = 0.087) had increased odds of reporting dyspareunia at 18 months postpartum. Another study followed 109 women who suffered second stage arrest of labour for a one year period and compared the operative vaginal deliveries (OVD) with the caesarean section cases. The OVD group included both vacuum extraction and forceps deliveries. They found no difference between the OVD group and the caesarean section group for sexual or pelvic floor function⁵⁵.

3.5.2 Sexual Dysfunction and Perineal Trauma.

More than 85% of women sustain some form of perineal trauma during vaginal delivery in the UK⁵⁶. The pain that occurs secondary to a perineal injury is likely

to be influenced by the severity of the injury. The reported rate of OASI in singleton, term, cephalic, vaginal first births in England has tripled from 1.8% to 5.9% from 2000 to 2012 (Royal College of Obstetricians and Gynaecologists (RCOG) Green-Top Guideline 2015)⁵⁷. The Data from the National Maternity and Perinatal Audit⁵⁸ (NMPA) found the mean incidence in the UK for OASI in all singleton births in the year 2016/2017 was 3.53% (range 1.4 – 6.6%), with an incidence of 6.1% in primiparous compared with 1.7% in multiparous women. The increasing number of OASIs emphasises the importance of knowing the impact that such injuries can have on female sexual function.

More severe degrees of perineal injury, such as though also involving the anal sphincter complex, will result in more extensive scarring as therefore more likely cause increased pain due to the involvement of more tissue planes. The repair of anal sphincter injuries also requires the use of longer lasting suture material which can cause perineal irritation and pain for a longer period of time. Another factor to consider is the psychological impact of sustaining such an injury which is likely to also have a negative effect on sexual functioning. The RCOG Green-top guideline⁵² on third and fourth degree tears states that “women should be advised that 60–80% of women are asymptomatic 12 months following delivery and EAS (external anal sphincter) repair” and whilst many areas of recovering from an OASI have been studied, the effect of such an injury on the sexual function has received much less attention.

The study by Brubaker et al⁵⁹ which has been discussed in more detail previously, confirms the finding that resumption of sexual activity at six months is significantly lower among women who suffered an OASI compared to those with an intact perineum, and that this difference could be up to a factor of 2.2. They found that at six months postpartum women who had vaginal deliveries without damage to the anal sphincter complex had a sexual activity rate of 94% compared to 88% for those who did sustain an OASI⁶⁰.

Fornell et al⁶¹ looked at 51 women ten years on from sustaining third degree tears. They found that OASI can have long-term effects on female sexual

function, with women still reporting symptoms such as a decrease in vaginal lubrication even ten years after delivery.

Signorello et al⁶² used self-reported questionnaires to evaluate symptoms six months postnatally. They included 211 women who had no tear or only a first degree tear and 68 women who had any more significant tear. They found higher rates of dyspareunia in the significant tear group, 77.4%, compared to 57.8% in the no/first degree tear group. This study is limited however by using a non-validated questionnaire and not further sub-dividing the significant tear cohort into those tears that included the anal sphincter complex and those that did not.

A comparative, descriptive study by Rogers et al in 2009⁵² prospectively looked at genital trauma at birth and sexual function at three months postpartum. Trauma was categorized into minor trauma (no trauma or first-degree perineal or other trauma that was not sutured), or major trauma (second-, third-, or fourth-degree lacerations or any trauma that required suturing). 70% of participants were in the minor trauma group and 30% in the major trauma group. They were asked to complete the Intimate Relationship Scale (IRS), a 12-item questionnaire validated as a measure of postpartum sexual function. They found no difference between the two groups for sexual activity or sexual dysfunction. Total IRS scores did not differ between trauma groups nor did complaints of dyspareunia. They did however demonstrate that other causes which did lead to problems in sexual function in the postpartum period, such as lack of desire and lack of interest in intimacy, were more significantly observed in the major trauma group. This study also did not make any distinction between second degree and OASI tears.

Van Brummen et al⁶³ performed a prospective longitudinal cohort study of 377 nulliparous women. They used a standardised and validated questionnaire, The Maudsley Marital Questionnaire (MMQ) at one year postpartum. They found women who had sustained OASI were five times less likely to be sexually active as compared with women who had sustained no perineal trauma.

Radestad et al⁶⁴ performed a population-based cohort study of 2134 Swedish women at one year postpartum, using a self-reported questionnaire. Adjusted relative risks with 95 percent confidence intervals for not having had sexual intercourse within three and six months, respectively, after childbirth were 1.5 (95% CI 1.2-1.8) and 1.6 (95% CI 1.2-2.3) for tears in the vagina; 1.4 (95% CI 1.1-1.6) and 1.5 (95% CI 1.1-2.1) for tears in the perineum; and 2.1 (95% CI 1.4-3.1) and 2.2 (95% CI 1.1-4.6) for tears in the sphincter ani and rectum. However, they also found that at one year these differences were no-longer statistically significant.

Palm et al⁶⁵ performed a retrospective case-control study to compare, amongst other things, the prevalence of dyspareunia in women who had and had not sustained OASI in Sweden. They included 305 women with an OASI and 297 women with spontaneous vaginal delivery but no OASI and followed them up for between 15 months and 8 years. In the OASI group, there was significantly more superficial coital pain compared to controls ($p= 0.02$), but they reported no statistically significant reduction in the women's quality of life. This study has a good number of OASI patients in it however does not distinguish between the types of tear in the other group (whether they were first or second degree tears) and has a very varied follow up time.

A qualitative study based on written responses from 625 women who sustained an OASI, was performed approximately one year after childbirth in Sweden by Lindqvist et al. They reported that many participants described “problems related to a non-functional sexual life, physical and psychological problems that left them feeling used and broken, and increased worries for their future health and pregnancies”⁶⁶.

Longer term studies are also conflicting in terms of the role that perineal trauma sustained has on developing FSD subsequently. Otero et al²⁷ performed a study using the FSFI on women 18 years after delivery. They found no statistically significant difference in sexual dysfunction between those women who had sustained OASIs and those who had not. Mous et al⁶⁷, on the other hand, found

that at 25 years post-delivery dyspareunia rates were 29% in the OASI group and only 13% in the control group.

3.5.3 Sexual Pain Disorder.

Sexual pain disorder is the most common aetiology of sexual dysfunction amongst women in the postpartum period⁶⁸. Pain during sexual activity may result from perineal injury sustained during any vaginal delivery, or as a consequence of perineal tears, episiotomies, or instrumental deliveries. Andrews et al⁶⁹ undertook a prospective study of primiparous women who delivered vaginally. All women had a perineal and rectal examination. They found that compared to an intact perineum or first degree tear, significantly more women experienced perineal pain after a second, third or fourth degree tear and that Obstetric Anal Sphincter Injuries (OASI) were associated with the most significant perineal pain. They also commented that spontaneous second degree tears caused less perineal pain than episiotomies.

Fodstad et al²⁸ performed a prospective observational study of 179 women to assess if different episiotomy techniques resulted in different perineal pain perception three months after delivery. Dyspareunia was reported by 46%, but no difference between episiotomy techniques ($p = 0.90$), or between episiotomy incision points ($p = 0.14$), was found.

3.5.4 Body Image.

Pregnancy and childbirth are life events that lead to enormous changes in body image²⁵ and there is an important link between body image and sexual function. A systematic review by Hodgkinson et al⁷⁰ looking at women's experiences of changing body image during their pregnancy and in the post-partum period highlighted the role of body dissatisfaction experienced by women at this time in their lives. Not only is there a change in body image that accompanies pregnancy, but there is also a change in genital body image in the post-partum period, which has also been shown to have an impact on sexual function⁶⁷. A study by Olsson et al⁷¹ interviewed 27 women between three and twenty-four months post-natally. They identified four key themes surrounding sexual

functioning in the postnatal period. Firstly, the role of body image after childbirth; secondly how sexual patterns are altered following adapting to the new stresses of family life; thirdly the discordance of sexual desire between the mothers and their partners and finally the necessity that the women had for reassurance that the symptoms they were experiencing were normal.

3.5.5 Depression.

Mental health is also intricately linked with FSD. The postpartum period brings an increased risk of mental health issues, especially postnatal depression. Chivers et al.⁷² used the FSFI, the Edinburgh Postnatal Depression Scale (EPDS) and items assessing current sexual behaviours to assess 77 women in the first year postpartum. The mean FSFI score was 23.0, with 37 women (65%) scoring in the range associated with clinical sexual dysfunction. Women with elevated EPDS scores had significantly lower total FSFI, arousal, orgasm, and satisfaction FSFI subscale scores (all p values <0.005) than the women not suffering from depression. Desire, lubrication, and pain FSFI subscale scores however were not significantly associated with depression status.

3.5.6 Parity.

As for the antenatal period, several studies have observed a difference in the effects of pregnancy on sexual function in multiparous and primiparous women. An Australian study found that primiparous women were more likely to be suffering from FSD at five months postnatally than their multiparous counterparts⁷³⁻⁷⁵.

Table 3. Summary of studies looking at postnatal sexual function in the last 20 years.

Authors	Date	Population	Measurement Tools	Results	Comments
Barrett et al. ⁶¹	2000	484 primips Intact= 61, 1 st degree= 19 2 nd degree= 35, episiotomy= 87, 3 rd degree=7, c/s= 39. UK.	Self-reported sexual behaviour and problems.	At 3 months dyspareunia significantly related to vaginal delivery, no longer significant at 6 months.	Not validated questionnaire. Small number of OASI.
Signorello et al ⁶⁶	2001	No tear or 1 st degree =211 2 nd /3 rd /4 th degree= 68 Primiparous. USA.	Self-reported questionnaire at 6 months recalling symptoms at 3 months.	Rate of dyspareunia: no tear/1 st = 57.8% Tear= 77.4%	Not validated questionnaire. Relies on patient recall.
Otero et al. ⁷⁶	2006	Control group=200 OASI= 197 Multiparous and primiparous. Switzerland.	FSFI. Retrospective. 18 years post delivery.	No difference between two groups.	Multiparous and primiparous women.

Van Brummen et al. ⁷⁷	2006	Intact= 50 1 st /2 nd degree= 96 Episiotomy= 144 OASI= 19 Primiparous. Netherlands	Prospective cohort study. MMQ at 3 and 12 months postnatally	Women were five times less likely to be sexually active after a third/fourth degree anal sphincter tear as compared with women with an intact perineum	Small number of OASI
Griffiths et al. ⁶⁸	2006	208 women 2 years postnatal. Multiparous and primiparous. Wales.	Retrospective study Postal questionnaire	Decrease in sexual satisfaction in vaginal delivery compared to caesarean section.	No distinction between type of vaginal delivery. Multiparous and primiparous women.
Andrews et al. ⁵²	2008	Intact perineum= 29 1 st degree= 17 2 nd degree= 136 3a= 28 >3b=31 Primiparous women. UK.	4 point validated verbal rating score and visual analogue scale	Significantly more pain at 7 weeks for OASIS. No difference between groups of OASIS.	Prospective. Only 7weeks Not full sexual function analysis.

Brubaker et al. ⁷⁸	2008	OASI= 407 Vaginal del no OASI= 390 ELCS=124 Primiparous women. USA	Sexual activity via telephone interview- PISQ12 at 6 weeks and 6 months.	Sexual activity: OASI= 88%, vaginal del no OASI= 94%, ELCS= 86%.	Telephone interview.
Mous et al. ⁷⁹ .	2008	OASI= 119 Control= 90 Multiparous and primiparous. Netherlands.	Self-reported questionnaire. Retrospective 25 years post-delivery.	Dyspareunia rates: OASI= 29% Control= 13%	Non- validated questionnaire. Multiparous and primiparous women.
Radestad et al. ⁸⁰	2008	2134 post-partum women (including 59 OASI). Sweden	Self-reported questionnaire. Prospective 1 year post-delivery.	RR for not having sexual activity within 6 months. Tear in vagina 1.6 Perineal tear 1.5 Anal sphincter tear 2.1 Rectal tear 2.2	Non- validated questionnaire. Small number of OASIS.

Rathfisch et al. ⁸¹	2010	55 primiparous women. Turkey	Perineal examination. Questionnaire and interview at 3 months post-natal.	Those who episiotomy/2 nd degree tears, had lower levels of libido, orgasm, and sexual satisfaction and more pain during intercourse.	Small sample No OASI Not validated questionnaire.
Baud et al. ⁸²	2011	OASI= 66 Controls= 192 Multiparous and primiparous. Switzerland.	FSFI Case-controlled retrospective study up to 6 years post-natal.	FSFI score OASI= 26.1 Controls= 27.3 A fetal occiput posterior position during childbirth was an independent risk factor severe sexual dysfunction	Multiparous and primiparous. Wide variety in control group.
Sundquist et al. ⁵⁰	2012	3a tear = 191 3b, 3c ^4 th = 55 Control = 245 Primiparous and multiparous women. Denmark.	3-question self-reported questionnaire. Retrospective 4-8 years post-natally.	Dyspareunia: Control= 3% 3a tears= 6% 3b, 3c and 4th= 2%	Non-validated questionnaire. Multiparous and primiparous.

Hosseini et al. ⁵³	2012	NVD= 114 ELCS= 99 Multiparous and primiparous. Turkey.	FSFI. 6 and 24 months post-natally.	There were no significant differences regarding six domains of sexual function, including desire (P = .55), arousal (P = .39), lubrication (P = .45), orgasm (P = .36), pain (P = .74), and satisfaction (P = .39) between the two groups.	No differentiation of type of tear. Multiparous and primiparous.
McDonald et al. ⁶⁴	2013	Intact= 539 Episiotomy= 293 Unsutured tear= 68 Sutured tear= 402. Primiparous and multiparous.	Self-reported questionnaires at 3, 6 and 12 months postpartum	Adjusted odds ratio of not having resumed sex at 6weeks compared to intact perineum; episiotomy = 3.43 or sutured perineal tear= 3.18.	No specific look at OASI as a group. Multiparous and primiparous.
Palm et al. ⁸³	2013	OASI= 219 Control= 198 Primiparous and multiparous women. Sweden.	Self-reported questionnaire. Retrospective 15 months to 8 years.	Dyspareunia: OASI= 18% Control = 9% No variation in deep dyspareunia.	Large variation in follow-up duration. Primiparous and multiparous.

De Souza et al. ⁵¹	2015	Intact= 76 1 st degree= 16 2 nd degree= 39 Episiotomy= 142 3 rd degree=10 Primips and multips. Australia.	FSFI. During pregnancy and 6 and 12 months post-natal. Prospective	Improved sexual function between 6 and 12 months after birth. No significant difference between the initial and 12-month scores, except for arousal, where there was a higher score at 12 months.	Small number of OASI
Barbara G et al. ⁸⁴	2016	45 Operative vaginal delivery (OVD). 99 caesarean section Primiparous. Italy.	FSFI and time to resumption of intercourse.	OVD had poorer scores on arousal, lubrication, orgasm, and global sexual functioning compared with the caesarean section group. The mode of delivery did not significantly affect time to resumption of sexual intercourse.	No conclusions can be drawn from this study regarding the impact of pelvic floor trauma on sexual functioning because of the high rate of episiotomies.
Fodstad et al. ⁶⁵	2016	OASI = 42 Controls = 20 per OASI case. Multiparous and primiparous. Norway.		Resumption of sexual activity at 8 weeks= 51.4%, 12 weeks= 75.2%, 1 year= 94.7%. OASI strongest predictor for delayed resumption of activity. OASI only significant predictor for dyspareunia at 1 year.	Small number of OASI Multiparous and primiparous.

Lindqvist et al. ⁸⁵	2019	625 postnatal women. Multiparous and primiparous women. Sweden.	Qualitative written responses to questionnaire. Retrospective.	Many participants described problems related to a non-functional sexual life.	Qualitative.
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3.5.7 Conclusions.

Although much work has been done on female sexual function in the postnatal period there remain a number of gaps in the existing body of knowledge. Many of the studies performed so far do not separate out the different types of perineal tear. This means that no reliable conclusions can be drawn with respect to the effect of different degrees of perineal trauma sustained on FSD. This is of particular importance as the incidence of more severe perineal trauma appears to be increasing. Other limitations of the studies available so far is that many do not separate out nulliparous and multiparous women, some rely on patient recall for their data and others do not use validated questionnaires.

This thesis aims to better understand the effect that different degrees of perineal trauma have on female sexual function postnatally.

3.6 Doctor's Assessment of Sexual Function and Pregnancy.

The final part of this study is to look at how well all of the above information regarding female sexual function during and after pregnancy is assessed by doctors and communicated to patients in the clinical setting.

3.6.1 How much is being discussed?

There are few studies looking at how well this topic is addressed by those working in women's health; perhaps a reflection of the low priority given to sexual function disorders as a whole. McCool et al⁸⁶ in Germany found that obstetricians and gynaecologists struggled to respond adequately to the problem resulting in both under-diagnosis and under-treatment of female sexual dysfunction. Sobecki et al³¹ reported that although the majority of American Obstetricians and Gynaecologists were routinely asking patients about their sexual activities, only 28.7% asked about sexual satisfaction and a mere 13.8% enquired about orgasm.

In a Canadian study performed by Corbacioglu et al⁴⁵ only one third of patients received education on sex in pregnancy and in nearly half of cases it was the patient who brought up the topic. In a Chinese study of pregnant women only 9.4% discussed sexuality with their doctors and half of them had to raise the topic themselves³².

Bartellas et al⁸⁷ reported that only 29% of women discussed sexual activity in pregnancy with their doctor. They found that in 49% of cases the women had to raise the issue herself and that 34% of women reported feeling uncomfortable with having to initiate the conversation. Most women (76%) who had not discussed these issues with their doctor felt they should have been discussed.

Barrett et al²⁸ reported that although 69% of women stated that a health professional had spoken to them about resuming sex after childbirth, it was usually by a general practitioner (GP) or by a health visitor, rather than an obstetrician or gynaecologist. 96% of women commented that the discussion had centered around the topic of contraception rather than sexual functioning. In 29% of cases the right time for resuming intercourse was discussed with them. In only 18% of cases was the possibility that there may be changes to, or problems with, their sexual function discussed.

3.6.2 Conclusions.

There are few studies looking at the approach of doctors towards female sexual function during and after pregnancy. More work is needed to assess what information is being discussed with both antenatal and post-natal patients regarding sexual function during this period and the changes that may occur. It is important to establish what are the current barriers to this very important topic being routinely discussed so that changes to practice can be made.

This thesis aims to look at the current situation with regards to obstetricians and gynaecologists discussing sexual function with antenatal and postnatal patients.

4 Methodology.

4.1 Introduction.

This chapter will describe the methods chosen in this study to investigate firstly, the effect that pregnancy has on sexual function, secondly, the effect that perineal trauma has on sexual function in the postnatal period and finally, the attitude of obstetricians and gynaecologists towards assessing female sexual function in the antenatal and postnatal periods. The chapter will be divided into the following sections.

A description of:

- The research questions and hypothesis. The aims and objectives of the research project.
- The design of the prospective cohort study used to examine the effect of pregnancy on female sexual function.
- The design of the prospective cohort study used to examine the effect of perineal trauma on female sexual function.
- The design of the survey into the attitudes of obstetricians and gynaecologists towards assessing female sexual function in the antenatal and postnatal periods.
- The ethical approval obtained.
- The statistical analysis used to interpret data.

4.2 Description of the Research Questions and Hypothesis.

4.2.1 The main research questions being asked by this project were:

1. Does pregnancy itself have a negative impact on female sexual function?
2. Does the extent of the perineal trauma sustained have an impact on postnatal female sexual function?
3. How does female sexual function change during the three trimesters of pregnancy?

4. Which aspects of sexual function (desire, arousal, lubrication, orgasm, satisfaction and pain) are affected by pregnancy.
5. What is the pattern of recovery of sexual function after childbirth in women with no perineal injury compared to those with more severe perineal injuries?
6. Does obstetric anal sphincter injury at delivery impact the recovery of sexual function after childbirth?
7. Which aspects of sexual function (desire, arousal, lubrication, orgasm, satisfaction and pain) are affected by perineal trauma?
8. What are the other factors that impact on post-partum sexual function?
9. What are the attitudes of obstetricians and gynaecologists towards assessing and managing female sexual dysfunction (FSD) in the antenatal and postnatal periods?
10. What are the barriers stopping obstetricians and gynaecologists from assessing and managing FSD in the antenatal and postnatal periods?

4.2.2 The Hypotheses.

Null hypothesis:

Pregnancy and perineal trauma do not have a negative impact on female sexual function.

Alternate hypothesis:

Pregnancy and perineal trauma have a negative impact on female sexual function.

4.3 Aims and Objectives.

Primary Objective

- To determine whether female sexual function, as assessed by a self-reported, validated questionnaire, the Female Sexual Function Index (FSFI) is affected negatively by pregnancy itself and any subsequent perineal trauma sustained.

Secondary Objective

- To determine how often obstetricians and gynaecologists discuss female sexual function with antenatal and postnatal patients, what methods are being using to do so and what the barriers to accurate investigation and management of FSD are.

4.4 Assessment Instruments.

Sexual dysfunction following childbirth remains an under researched area and a lack of proper assessment tools of female sexual dysfunction is a contributory factor for the deficiency of adequately powered studies. The discrepancies in the outcomes used to determine FSD also makes it difficult to do accurate comparisons between studies. The possible outcome measures that can be used will now be discussed.

4.4.1 Objective measures.

The most commonly used instrument to objectively assess female sexual response is the vaginal photoplethysmograph⁸⁸. The photoplethysmography primarily measures vaginal vasoengorgement. It can be used to measure vaginal blood volume or vaginal pulse amplitude (VPA), the latter being considered the more sensitive and reliable calculation and therefore the more frequently used option in studies⁸⁹. It works by emitting light through a diode and detecting the amount of light back-scattered to the photocell detector that is within the probe from the surrounding vasculature. The method, however, remains poorly standardized and is not suitable for larger clinical trials and so was not used for this project. Other methods such as labial temperature, clitoral blood-flow measurements, doppler ultrasound and magnetic resonance imagery have been reported, but again with minimal clinical application at present^{90,91}.

4.4.2 Subjective Measures.

The use of self-reported questionnaires as a tool to assess female sexual function is the most commonly used method in clinical studies and has some notable

advantages. The use of interviews versus self-reported questionnaires has been studied. For more intimate and personal topics self-reported questionnaires have been shown to be more likely to generate reliable answers than an interview setting does^{92,93}. Given that the topic of sexual functioning remains a sensitive and potentially embarrassing one it was felt that there was a greater chance that participants would give more accurate answers using a self-reported questionnaire, rather than an interview technique. Completing an online questionnaire, alone, in the privacy of one's own home is likely to create a greater sense of anonymity and thus increase the validity of the information divulged.

There are a number of patient reported outcome measures (PROM) that are in use to look at female sexual function. These provide standardized, fairly non-invasive, cheap and easy to administer tools that generate scores amenable to statistical analysis. Some of the different PROM tools available were evaluated to find the most suitable one for this study.

4.4.2.1 The Derogatis Sexual Functioning Inventory (DSFI).

The DSFI is a self-reported questionnaire that uses ten domains to create a 245-item multidimensional scale to assess sexual behaviour in both men and women⁹⁴. The DSFI has been shown to be highly reliable and have strong psychometric properties⁹⁵. It was not however chosen for this study due to its complexity and length, which would likely have put participants off and have resulted in a decreased response rate.

4.4.2.2 The Sexual Function Questionnaire (SFQ).

The SFQ was developed as a multidimensional, patient-centered instrument, it addresses all aspects of the sexual response cycle. It is a 31-item questionnaire that was originally devised to measure outcomes in clinical trials of sildenafil for women with sexual arousal problems⁹⁶. It was validated in two large scale clinical trials and was found to have significant differences between patient and control groups ($p < 0.0001$). There was also strong internal consistency and test-

retest reliability. It was not chosen for our study as it is longer than some of the other available tests and it was feared that this may increase drop-out rates.

4.4.2.3 The Female Sexual Distress Scale (FSDS).

The FSDS was created to evaluate personal distress in FSD. It is a uni-dimensional 12-item questionnaire that was validated using three clinical trials and found to have a high degree of discriminative ability between sexually functional and dysfunctional women, with a high degree of internal consistency and test-retest reliability³⁹. It was not chosen for this study as it focusses mainly on distress and therefore does not cover all aspects of sexual dysfunction.

4.4.2.4 The Intimacy Relationship Scale (IRS)

The IRS is a brief self-administered questionnaire that was designed specifically for use in post-partum couples⁹⁷. It was therefore not chosen as it was deemed less suitable for use in the antenatal cohort of patients. It also focusses on the couple rather than just the woman, who is the topic of this thesis.

4.4.2.5 The Maudsley Marital Questionnaire (MMQ).

The MMQ is a 20-item scale designed to assess three areas; marital, sexual and general life adjustments⁹⁸. The focus on marital status is a somewhat outdated concept now and so the MMQ was not chosen for this study.

4.4.2.6 The female sexual function index (FSFI).

The FSFI is a self-report questionnaire which is considered a useful tool in assessment of sexual dysfunction³³. It assesses six domains of sexual function (desire, arousal, lubrication, orgasm, satisfaction, and pain) via 19 questions and provides a full-scale score as well as an individual score for each of the domains. It was initially developed specifically for use in clinical trials about FSD. It has been validated in a multicenter clinical trial of women with sexual arousal disorder and age matched controls. Highly significant differences were found between the two test groups in all six domains of the questionnaire and there was a high level of internal consistency and test-retest reliability. This was the

questionnaire chosen for this study due to its ease of use and design specifically for use in FSD.

The decision was made for the questionnaire to be completed online as this was a young patient cohort who would all be familiar with using the internet. There is also evidence that online questionnaires have increased response rates when compared with postal questionnaires⁹⁹. The full questionnaire can be seen in the Appendix 8.3.

There are however some limitations to the FSFI. The FSFI was not designed for use in the pregnant population and was not designed as a diagnostic tool. It was also developed in 2000, which is relevant as the current definitions of FSD are based upon the DSM- V from 2013. This causes some disparity as the FSFI centers around there being six domains of sexual function, whereas the DSM- V streamlined the six areas mentioned in the DSM- IV into only three categories. The FSFI also only asks about problems in the last four weeks. To make a diagnosis of FSD the DSM- V requires women to be experiencing their problems over a six- month period.

The FSFI is also not a measure of sexual experience, knowledge, attitudes or interpersonal functioning in women and cannot be used as a substitute for a complete sexual history in clinical evaluation.

4.5 Design of the prospective study assessing sexual function during pregnancy.

4.5.1 The study sample.

The study sample was recruited from the Norfolk and Norwich University Hospital (NNUH) between February 2017 and January 2018. The NNUH is a tertiary hospital in the East of England which has around 5500 deliveries per annum, of which roughly 50% are primiparous. Only primiparous women were

recruited in order to reduce confounding factors. Studies have found that primiparous women suffer from more sexual dysfunction in the antenatal^{43,45} period than multiparous women do.

Patients were recruited in person at their first trimester ultrasound scan in antenatal clinic. This meant that all women were aware of the pregnancy, another factor that has been shown to increase reported rates of FSD³¹.

4.5.2 The consent process.

The study concept, design and process was explained to potential participants verbally initially by the principal investigator. Subsequently they received a printed patient information leaflet (see Appendix 8.1) to take away with them. During this initial meeting participants had the opportunity to ask questions regarding the study itself and what their involvement in it would be. They had the option to consent immediately should they wish to but were informed they would be contacted a week later to confirm their decision. Written consent was taken, one copy given to the patient, one copy filed in the patients notes and the other in the research file (Appendix 8.2).

4.5.3 Inclusion and Exclusion criteria.

4.5.3.1 Inclusion criteria

To be eligible for this study, patients needed to meet all the following inclusion criteria:

1. Having a sexual partner at the time of recruitment.

This was decided so that the lack of a relationship was not a confounding factor for reporting no sexual activity.

2. Be aged 18-55 years inclusive.

The lower age limit was based on ethical approval being granted for assessing adults only and the upper age limit being related to the oldest mother who had delivered at the NNUH in the last 5 years.

3. Have a good understanding of written and spoken English language.

The FSFI and patient information leaflets could not be translated into multiple languages and so were only provided in English. The latest census from

2011¹⁰⁰ showed that 92.1% of the population in Norwich spoke English, meaning that most patients would be expected to fit this inclusion criteria.

4. Be provided written informed consent.

This was a requirement of ethical approval.

5. Have access to the internet to complete the questionnaire online.

For practicality issues as well as improved response rates it was decided to collect all data online, with a young patient cohort it was felt that this was unlikely to exclude many participants.

6. Be primiparous.

This was chosen to reduce the numbers of confounding factors. Also, it means that when patients were comparing their current situation to their pre-pregnancy state this would be a nulliparous state, and so be unaffected by previous pregnancies and deliveries¹⁰¹.

4.5.3.2 Exclusion criteria

The following criteria should exclude the patient from participating in the study:

1. Any woman suffering a miscarriage, stillbirth, neonatal death or significant morbidity in the child.
2. An inability to understand written and spoken English due to any language barrier or learning disability.

4.5.4 Data collection.

Once consented patients were screened for the inclusion and exclusion criteria and were asked some basic demographic details: age, BMI, ethnicity, marital status and occupation. They were then asked to complete the Female Sexual Function Index (FSFI) questionnaire, thus providing data for the first trimester (up to the 12th week gestation). They were then asked to complete the questionnaire two more times; once in the second trimester (weeks 13 to 24) and a final time in the third trimester (from 25 weeks gestation). The third trimester questionnaire was sent via email before 28 weeks gestation in order to still capture the majority of patients who delivered pre-term. The questionnaire was completed online using a specially created website (fsfi.co.uk) shown in the figure below.

Figure 1. The Data Collection Website.

The screenshot shows a web page for a study titled "A study of female sexual function during and after pregnancy". The page header includes "Norfolk and Norwich University Hospitals NHS" and "NHS Foundation Trust" on the left, and "Home Help Contact" on the right. The main heading is "A study of female sexual function during and after pregnancy". Below this, there is a section of text: "These questions ask about your sexual feelings and responses during the past 4 weeks. Please answer the following questions as honestly and clearly as possible. Your responses will be kept completely confidential. In answering these questions the following definitions apply:". This is followed by a bulleted list of definitions for sexual activity, intercourse, stimulation, desire, and arousal. At the bottom, there is a section titled "Your email address" with the text "We are asking for your email address so that we can send you follow-up reminders to do the questionnaire again at set time intervals." and a label "Email" with a red asterisk indicating a required field.

A unique ID number was generated and assigned to the respondents at their first set of answers. The respondent was asked to authorize email reminders being sent at set intervals to their email address up to a maximum of three times. Their answers to the first questionnaire were stored on the website and the subsequent email reminders had a link back to the website with the respondent's ID number appended, taking them directly to questionnaire. The responses were stored on the website which had an ssl certificate installed and therefore all data sent between a visitor's browser and the web hosting account was encrypted to comply with general data protection (GDPR) regulations.

4.6 Design of the prospective study assessing sexual function following different types of perineal trauma.

4.6.1 The study sample.

A second cohort was recruited using the birth registry on the NNUH delivery suite between February 2017 and December 2018. Subjects were recruited in order to achieve the required numbers of each type of perineal tears. The women were approached whilst still in hospital during the immediate postnatal period.

The control group consisted of primiparous women undergoing elective caesarean sections, thus having sustained no perineal trauma and not having been through any stage of labour. There were two study groups recruited, the first one being primiparous women who sustained second degree tears or episiotomies and the second one being those women who had obstetric anal sphincter injuries (OASI). Primiparous only women were selected. Studies have found that primiparous women suffer from more sexual dysfunction in the postnatal⁷² period than multiparous women. Given that OASI are more likely to occur in primiparous women (OR 5.8)¹⁰² and in a previous study at the NNUH on OASI patients 78% were primiparous¹⁰³ all groups were limited to primiparous women to reduce confounding factors. Episiotomies and second degree tears were grouped together as it has previously been shown that there is no difference in rates of postnatal FSD between the two groups^{69,84}.

4.6.2 The consent process.

As for the antenatal study patients were consented in person, with a verbal explanation of the study. The study concept, design and process was explained, and they received a printed patient information leaflet as well. They had the opportunity to ask questions regarding the study itself and their involvement in it. They had the option to consent immediately should they wish to but were informed they would be contacted a week later to confirm their decision. Written consent was taken, and one copied filed in the patients notes and the other in the research file.

4.6.3 Data collection.

Once consented, patients were asked some basic demographic details: age, BMI, ethnicity and birth weight of their child. All three groups were asked to complete the Female Sexual Function Index (FSFI) questionnaire twice, once at three months and once at six months postnatally via email invitation. The questionnaire was completed online using the same website as for the antenatal study (fsfi.co.uk). A unique ID number was generated and assigned to the respondents at their first set of answers. The respondent was asked to authorize

email reminders being sent at set intervals to their email address up to a maximum of three times.

4.6.4 Inclusion and Exclusion criteria.

These were the same as for the antenatal study.

4.6.4.1 Inclusion criteria

To be eligible for this study, patients needed to meet all the following inclusion criteria:

1. Having a vaginal delivery and sustaining either an episiotomy, a second degree tear or an OASI. Instrumental deliveries were included as well as normal vaginal deliveries.
2. Having a sexual partner at the time of recruitment.
3. Being aged 18-55 years inclusive.
4. Having a good understanding of written and spoken English language.
5. Providing written informed consent.
6. Having access to the internet to complete questionnaire online.
7. Being primiparous.

4.6.4.2 Exclusion criteria

The following criteria should exclude the patient from participating in the study:

1. Any woman with a stillbirth, neonatal death or significant morbidity in the child.
2. Being unable to understand written and spoken English due to any language barriers or learning difficulties.

4.7 Design of the survey into the attitudes of obstetricians and gynaecologists towards assessing female sexual function.

4.7.1 Recruitment of study participants.

The anonymous 14 question survey was disseminated to a variety of hospitals in the south east of England via email to obstetrics and gynaecology doctors across all levels of experience. Professional mailing lists such as departmental lists and trainee lists were used to send the questionnaire out. The survey was open between January 2018 and January 2019 and respondents completed the questionnaire once only.

4.7.2 The survey.

A survey monkey questionnaire was designed asking about the following topics. (see Appendix 8.5 for full questionnaire).

1. The frequency of discussion of sexual function with antenatal patients.
2. The frequency of discussion about the impact of mode of delivery on female sexual function in antenatal patients.
3. The frequency of assessment of pre-existing sexual dysfunction prior to pregnancy in antenatal patients.
4. The frequency of discussion of sexual function with postnatal patients.
5. The frequency of discussion regarding future mode of delivery amongst postnatal patients with sexual function problems.
6. The frequency of use of any standardised questionnaires to discuss sexual function with patients.
7. The steps taken following identifying sexual function problems.
8. Whether respondents felt it was more the role of the GP than the obstetrician and gynaecologist to discuss sexual function with patients.
9. Whether respondents felt female sexual function should have more importance in the RCOG curriculum.
10. Whether respondents felt they were satisfied with the extent of their explanations of perineal trauma sustained to post-natal patients.
11. The reasons behind sexual function not being discussed with patients.
The options given for respondents were based on frequently cited causes¹⁰⁴:

Lack of training

Lack of practice

Fear of “opening the flood gates’
Covert presentation of the problem
Lack of time
Lack of effective treatments
Associated stigma
Embarrassment of doctor, patient or both
Sensitive subject
Difficult subject
Gender
Age
Culture.

12. The stage of career.

13. Their gender.

14. Their age group.

4.8 Ethical approval.

Ethical approval was obtained via the Integrated Research Application System (IRAS) and also approved by the local Research Ethics Committee (REC) (project ID number 217595, REC reference number 16/EM/0522- see Appendix). Discussion of sexual function could be sensitive and embarrassing to some study participants. The use of a self-administered questionnaire that can be filled in in the most convenient time and place would minimize the distress to the patients. Though the questionnaire involves areas in sexual function it does not ask on more sensitive issues such as sexual orientation, sexual behaviours or any issues such as sexual abuse.

Participation in this study was voluntary and subjects were able to decline or withdraw participation at any time point in the study without giving a reason. They were also reassured that declining or withdrawing participation would not in any way affect the standard of the medical treatment they received.

All recruits received a patient information leaflet (see Appendix 8.1) explaining the

rationale, design, aims of the study and contact details of the investigators at the time of first contact. Written consent was recorded in a participant consent form (see Appendix 8.2) and was explained by investigators after explanation of the details and purpose of the study, the intervention and their right to decline participation.

The data of the study including scores of the questionnaire was stored in a password encrypted database in a hospital computer. Access to computers in the hospital is password protected for each user. The NHS code of confidentiality¹⁰⁵ was followed, and all patient details were anonymized. When consenting for participation the participants were also offered the choice to receiving a summary sheet of the results and the end of the study.

For the doctors' survey, advice was sought from the research and development department of the hospital trust and a formal application was made. It was advised that due to the nature of the study, formal ethical approval was not required.

4.9 Statistical analysis.

4.9.1 Sample Size.

The historical birth rates data from the NNUH was examined to help calculate sample sizes required. Between 21st April 2015 and 31st March 2016, the NNUH had a total of 5548 deliveries, of which 2442 were to primiparous women. Of the primiparous women having vaginal deliveries; 150 had first degree tears, 651 had second degree tears, 555 had episiotomies, 150 had third degree tears and 8 had fourth degree tears.

4.9.1.1 Post-natal group sample size.

The sample size was calculated using observations of previous work described by Signorello et al⁶¹. They described levels of postpartum dyspareunia at three months after childbirth in women with and without major perineal injury to be 61% vs 40% respectively. The proportion of women suffering from dyspareunia without an OASI

was calculated by averaging the proportions between no tears and second degree tears¹⁰⁶. With a significance level of 5% and a study power of 80%, a sample size of 78 per group with a 20% loss to follow up rate would detect a difference of 25%. The sample size was calculated using Statistical Analysis System (SAS) computer statistical software. There were 85 patients recruited to each of the three post-natal cohorts.

4.9.1.2 Ante-natal group sample size.

For the antenatal study a significance level of 5% and a study power of 80% and an assumed 20% loss to follow-up rate was again used. 85 women were recruited to ante-natal study group.

4.9.1.3 Doctor's survey sample size.

The survey was kept open for a 12-month period to allow the maximum number of responses across all levels of training.

4.9.2 The FSFI.

4.9.2.1 Scoring.

The FSFI generates a composite score as well as a score for each of the six domains- desire, arousal, lubrication, orgasm, satisfaction and pain (see Appendix 8.4 for scoring system).

Table 4. FSFI Domains and scoring.

Domain	Questions	Score Range	Factor	Minimum Score	Maximum Score
Desire	1, 2	1 – 5	0.6	1.2	6.0
Arousal	3, 4, 5, 6	0 – 5	0.3	0	6.0
Lubrication	7, 8, 9, 10	0 – 5	0.3	0	6.0
Orgasm	11, 12, 13	0 – 5	0.4	0	6.0
Satisfaction	14, 15, 16	0 (or 1) – 5	0.4	0.8	6.0
Pain	17, 18, 19	0 – 5	0.4	0	6.0
Full Scale Score Range				2.0	36.0

4.9.2.2 Cut-off scores.

Wiegel et al.¹⁰⁷ cross-validated the FSFI in samples of women with mixed sexual dysfunction and developed diagnostic cut off scores for the FSFI. They found a total FSFI score of 26.55 to be the optimal cut score for differentiating women with and without sexual dysfunction. A total score of, or below 26.55 was therefore taken to represent sexual dysfunction in this study.

4.9.3 Statistical Tests Used.

4.9.3.1 The Antenatal Study.

Demographic data was described used mean and standard deviation. The antenatal FSFI scores data were not normally distributed however, and so the median and interquartile range were reported. Statistical analysis was performed on the full scale FSFI scores as well as on the six domain scores (desire, arousal, lubrication, orgasm, satisfaction and pain). Pre-determined cut-off scores for the full scale FSFI score were used to calculate levels of FSD. To test the difference

in medians at each trimester the signed rank test was conducted, and Friedman's ANOVA of row mean scores test was also performed to test there was no difference in responses across all trimesters. Throughout a p value < 0.05 was considered statistically significant.

4.9.3.2 The postnatal study.

The data for the postnatal cohort was also not normally distributed and so medians and interquartile ranges were reported for full scale scores and each of the six domains. Due to the data being non-parametric a Kruskal Wallis test was performed to look for statistical difference in the scores at three months vs six months postnatally and rates of FSD. Empirical distribution plots were also used for the full scale scores at the three and six months in order to compare the three study groups.

4.9.3.3 The doctors' survey.

Data from the doctors' survey was described using mean and standard deviation for demographic details and percentages were used for categorical data. Comparison of independent data was displayed using bar graphs and pies charts were used to visualise frequency responses.

5 The Effect of Pregnancy on Female Sexual Function.

5.1 Introduction.

The literature review and methodology of this part of the study have previously been discussed in chapters 1 and 2 respectively. This chapter will therefore focus on the findings obtained from the study and include a discussion on the interpretation and significance of them.

This chapter will be divided into the following sections:

A description of:

- The results for the first trimester.
- The results for the second trimester.
- The results for the third trimester.
- A comparison between the results for the three trimesters.

5.2 Findings.

85 patients were recruited to the study. Four were lost to follow up, two were withdrawn from the study as they suffered miscarriages, and one data set was incomplete, leaving 78 women in the study.

5.2.1 Demographics.

Basic demographic data was taken at the initial meeting. Data for age, BMI and ethnicity were taken from the antenatal booking appointment and so represent values in the first trimester. The mean age for this sample was 27.3 (standard deviation $SD = 7.6$) with the youngest being 19 and the oldest being 45 (Table 5). The mean BMI was 25.6 ($SD = 5.6$) with the lowest BMI being 18 and the highest being 39.5 (Table 6). The vast majority of respondents (90%) were of white British ethnicity (Table 7). These demographics are representative of the population served by the NNUH.

Table 5. Age distribution.

Age Range	N (%)
18-25	19 (24.1)
26-30	28 (35.4)
31-35	17 (22.8)
36-40	9 (11.4)
41-45	4 (5.1)
>45	1 (1.3)
Mean (SD)	27.3 (7.6)

Table 6. Body Mass Index.

BMI Category	N (%)
Under-weight <18.5	7 (9.0)
Normal weight 18-25	31 (39.7)
Over-weight 26-30	25 (32.1)
Obese >30	15 (19.2)
Mean (SD)	25.3 (5.6)

Table 7. Ethnicity.

Ethnic Group	N (%)
White British	70 (90)
White Other	2 (2.6)
Asian Indian	2 (2.6)
Asian Chinese	2 (2.6)
Black	1 (1.3)
Mixed	1 (1.3)

5.2.2 FSFI Scores.

The data collated for the FSFI scores was found to be non-parametric and so the median and interquartile ranges were used to describe the data. In order to look at the difference in median values during each trimester the signed rank test was employed. A Friedman's ANOVA of row median scores test was performed to assess if there was any difference in responses between the three trimesters. This statistical test was selected as it is a non-parametric test used to compare data

from three or more groups. Friedman’s ANOVA showed that there was a very significant decrease in all scores (the full scale score and the six domains- desire, lubrication, arousal, orgasm, satisfaction and pain), from the first trimester to the third trimester with each outcome having a p value of less than 0.0001.

The results for the full scale FSFI scores and the six domains of sexual function for each of the three trimesters are shown in the tables below.

Table 8. First Trimester FSFI Scores.

	N	Median	Interquartile range
Full scale	80	27.4	18 - 30.6
Desire	80	3.6	2.4 - 4.2
Arousal	80	4.2	2.4 - 4.8
Lubrication	80	4.2	2.4 – 5.4
Orgasm	80	5.2	2.4 – 6.0
Satisfaction	80	5	3.6 – 6.0
Pain	80	5.4	3.0 – 6.0

Table 9. Second Trimester FSFI Scores.

	N	Median	Interquartile range
Full scale	78	24.8	20.6 - 28.8
Desire	78	3.6	2.4 - 4.8
Arousal	78	3.6	3.0 - 4.8
Lubrication	78	4.2	2.4 - 4.8
Orgasm	78	4.8	3.2 - 5.2
Satisfaction	78	4.4	2.8 - 5.2
Pain	78	4.8	3.6 - 5.6

Table 10. Third Trimester FSFI Scores.

	N	Median	Interquartile range
Full scale	78	22	16.2 – 25.0
Desire	78	3	2.4 - 3.6
Arousal	78	3.6	1.8 - 4.2
Lubrication	78	3.6	2.4 - 4.2
Orgasm	78	3.6	1.2 - 4.8
Satisfaction	78	3.6	1.6 - 4.8
Pain	78	3.6	2.4 - 4.8

The following tables show a comparison of the data collected between the three trimesters of pregnancy. The median values of all six domains and the full scale scores is first compared, followed by a comparison of the first and the second trimester and then the first and third trimester and finally the second and third trimester. The percentage of women not engaging in sexual activity is also compared between the trimester, as is the proportion of women classified as having FSD.

Table 11. Median values in each trimester.

Domain	1st Trimester	2nd Trimester	3rd Trimester
Full-scale	27.4	24	22
Desire	3.6	3.6	3.0
Arousal	4.2	3.6	3.6
Lubrication	4.2	4.2	3.6
Orgasm	5.2	4.8	3.6
Satisfaction	5.0	4.4	3.6
Pain	5.4	4.8	3.6

Table 12. Comparison of First and Second Trimester FSFI Scores.

Trimester 1 vs 2	N	Median	Interquartile range	P- value
Full scale	78	1.2	0 – 2.8	0.003
Desire	78	0	0 - 0.6	0.4345
Arousal	78	0	0 – 0.6	0.1851
Lubrication	78	0	0 – 0.6	0.0557
Orgasm	78	0.4	0 – 0.8	0.0142
Satisfaction	78	0	0 – 0.8	0.005
Pain	78	0	0 – 0.8	0.0771

Table 13. Comparison of First and Third Trimester FSFI Scores.

Trimester 1 vs 3	N	Median	Interquartile range	P- value
Full Scale	78	5	0 – 2.4	<.0001
Desire	78	0	0 – 1.2	0.0006
Arousal	78	0.6	0 – 1.2	<.0001
Lubrication	78	0.6	0 -1.2	<.0001
Orgasm	78	0.8	0 – 1.6	<.0001
Satisfaction	78	1.2	0.4 – 1.6	<.0001
Pain	78	1.2	0 -2	<.0001

Table 14. Comparison of Second and Third Trimester FSFI Scores.

Trimester 2 vs 3	N	Median	Interquartile range	P- value
Full Scale	78	3.2	1.2 - 5.4	<.0001
Desire	78	0.6	0 - 1.2	0.0006
Arousal	78	0.6	0 - 1.2	<.0001
Lubrication	78	0	0 - 0.6	<.0001
Orgasm	78	0.4	0 - 1.2	<.0001
Satisfaction	78	0.4	0 - 1.2	<.0001
Pain	78	0.8	0 - 1.6	<.0001

Table 15. Percentage of women not having sexual intercourse by trimester.

Trimester	% not having sexual intercourse
1st	19.4%
2nd	12.5%
3rd	20.4%

Table 16. Numbers of women being classified as having FSD by trimester.

Trimester	n (%)
1st	30 (37.5)
2nd	50 (63.3)
3rd	68 (86.1)

Figure 2. Distribution of Full Scale Scores by Trimester.

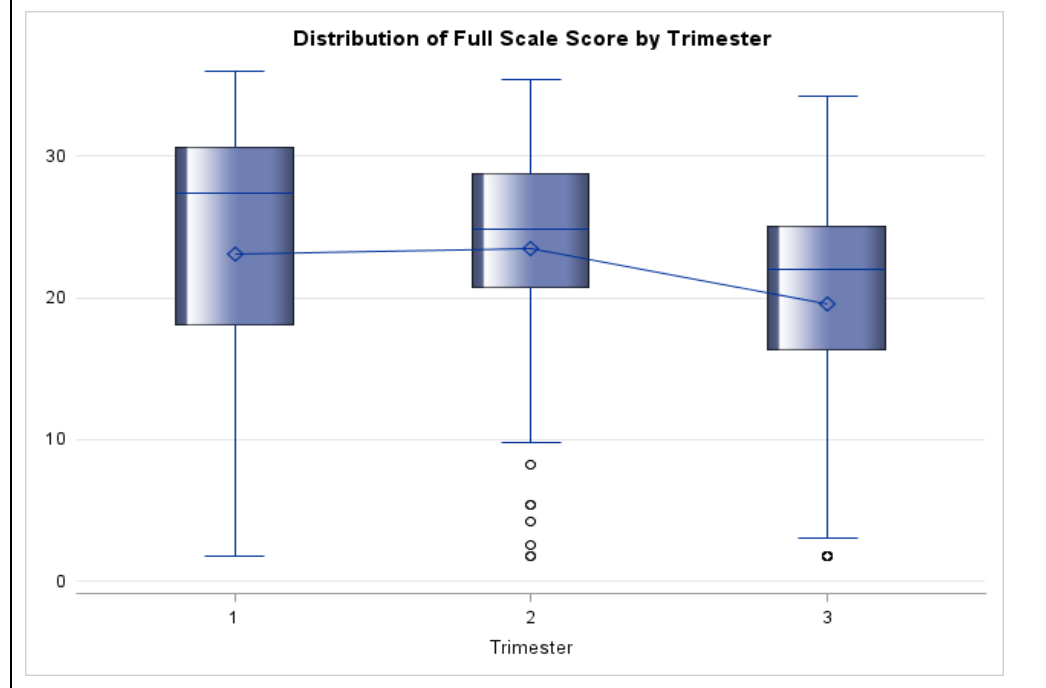


Figure 3. Distribution of Desire Scores by Trimester.

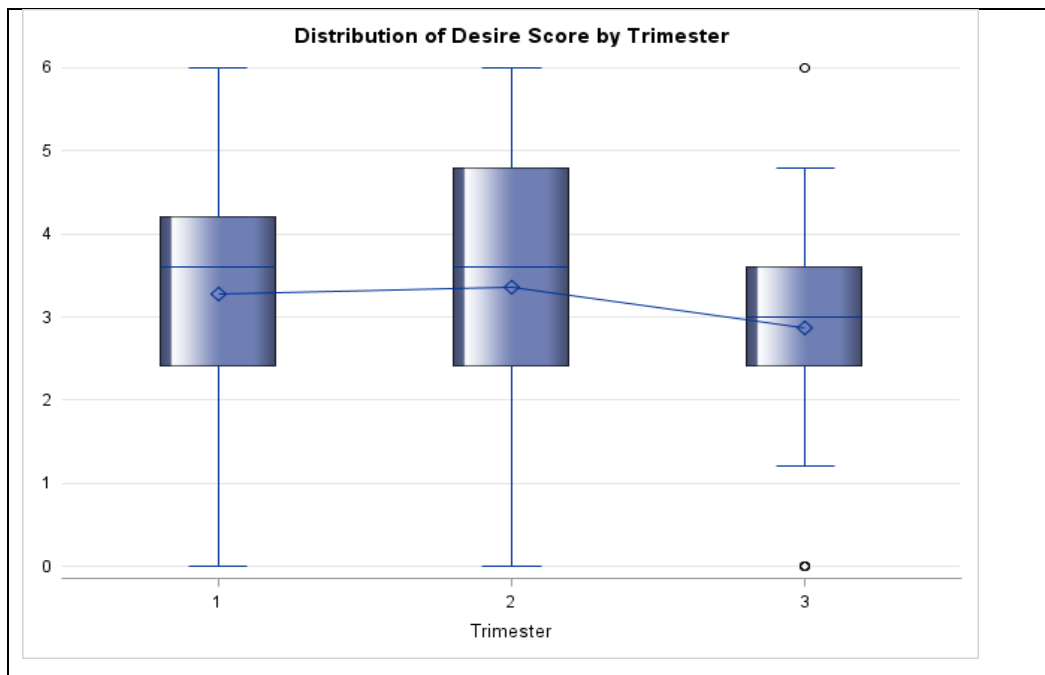


Figure 4. Distribution of Arousal Scores by Trimester.

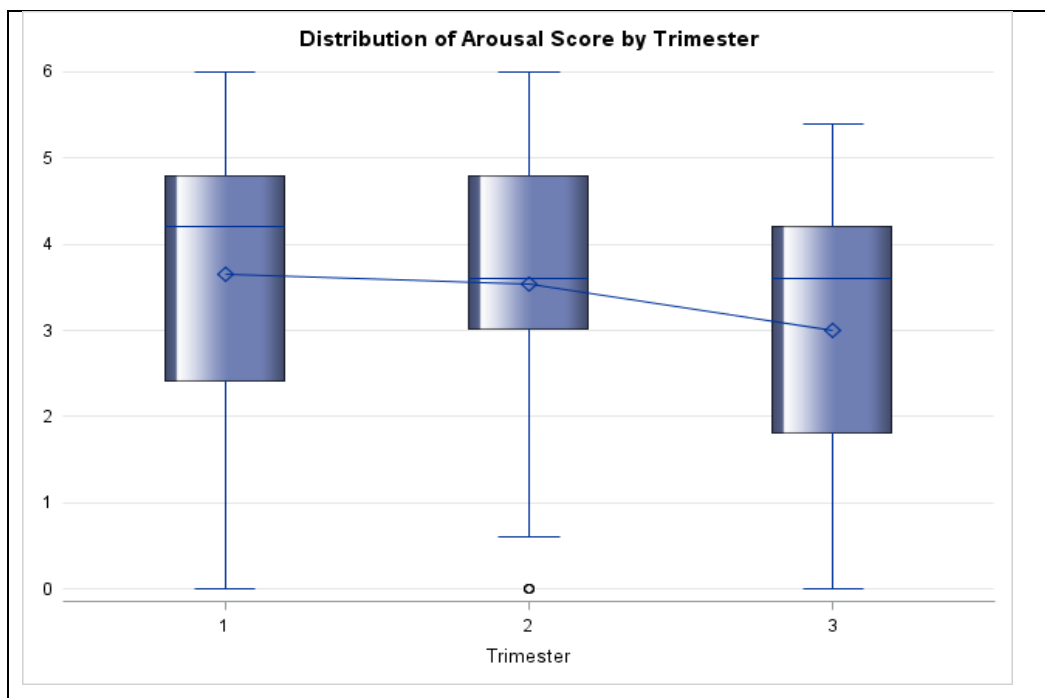


Figure 5. Distribution of Lubrication Scores by Trimester.



Figure 6. Distribution of Orgasm Score by Trimester.

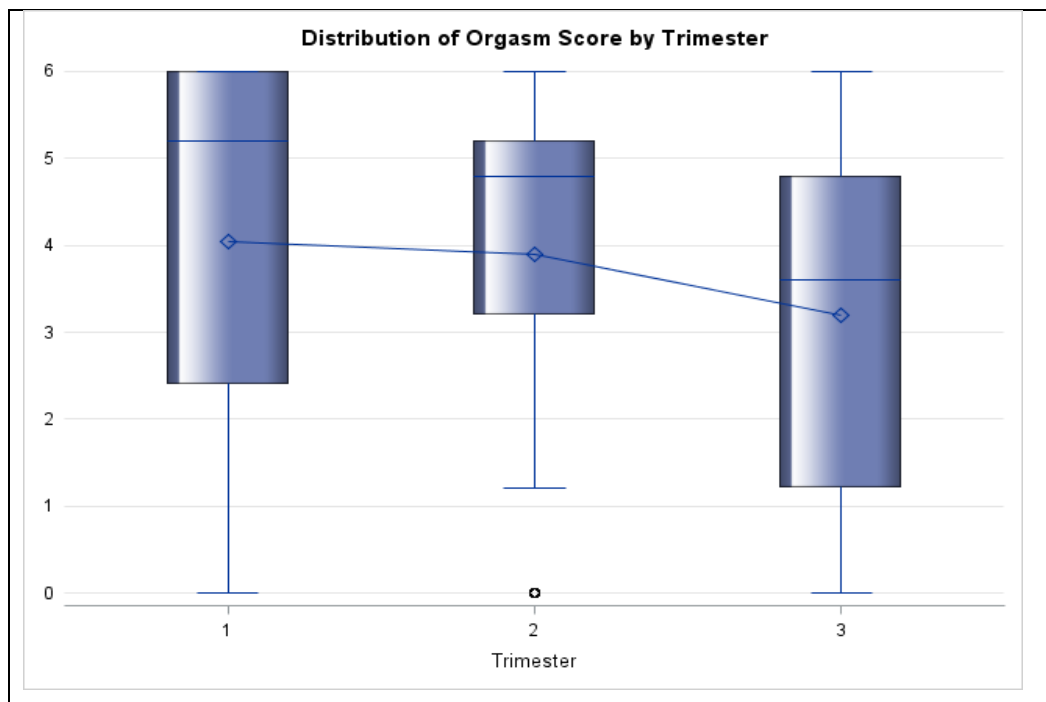


Figure 7. Distribution of Satisfaction Scores by Trimester.

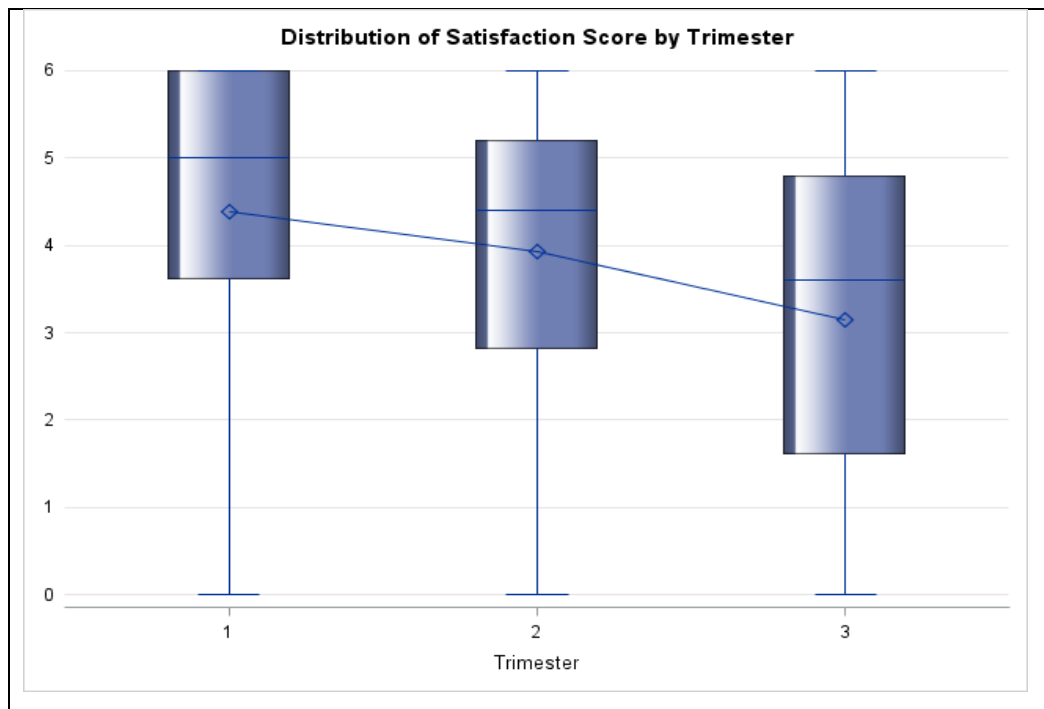
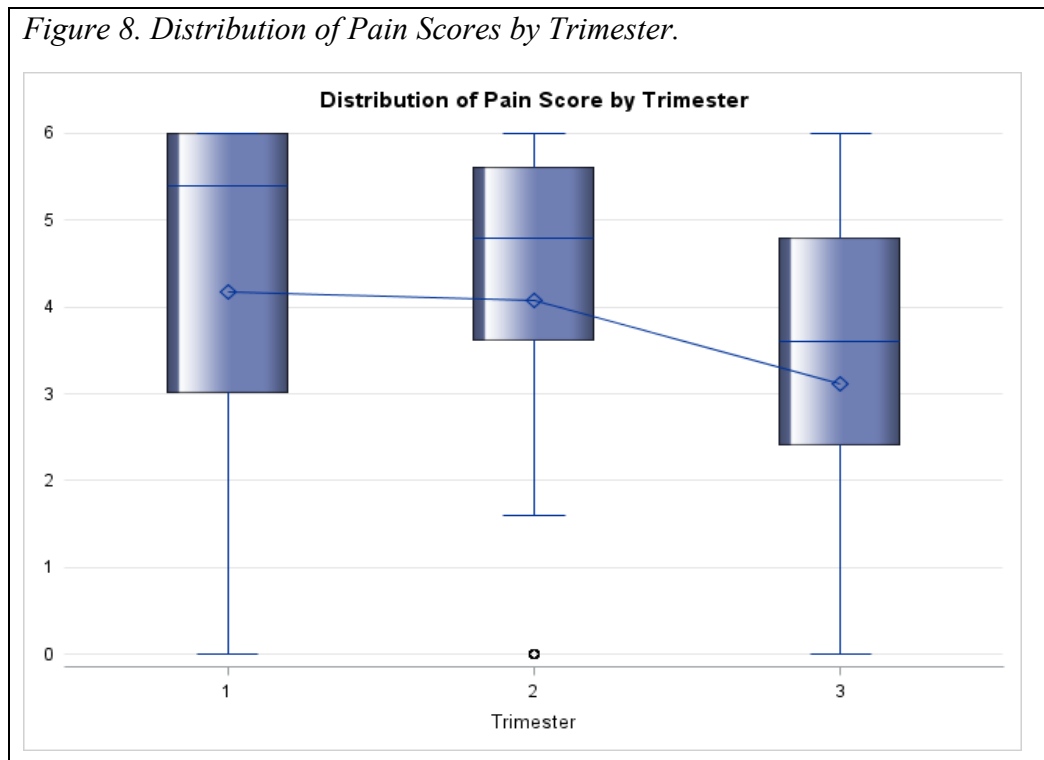


Figure 8. Distribution of Pain Scores by Trimester.



The results from this study show an overall decrease in total FSFI score across the three trimesters, from a median full-scale score of 27.5 in the first trimester, to 24.7 in the second and 21.4 in the third trimester (Table 8). This decline in

full-scale score as gestation progresses is mirrored in the six domain scores, with only desire and lubrication showing no change between the first and second trimesters and arousal showing no change between the second and third trimesters (Table 8).

Using the validated cut-off score of 26.55 for FSD there were 30 women meeting the criteria for diagnosis of FSD in the first trimester, 50 in the second and 68 in the third. This means that by the third trimester 86.1% of women would be classified as having sexual dysfunction (Table 9).

The only improvement seen in this study during the second trimester was an increase in the percentage of woman engaging in sexual intercourse when compared to the first trimester (Table 7). In the 1st trimester 19.4% of women were not engaging in sexual intercourse, this figure dropped to 12.5% in the second trimester and then climbed back up to 20.4% in the third trimester.

5.3 Discussion.

It is evident that pregnancy is a very unique time in terms of the physical, hormonal, psychological and social changes that occur. The art theorist Amelia Jones described pregnancy as “one of the most extreme states of the human condition” when describing a recent exhibition at the Whitechapel Gallery in London entitled “Bumped Body” in the “Self Collection” which examined shifting concepts of selfhood and the creation ‘tension between self as subject and self as object’ that accompanies the pregnant state. This shift that the female body and mind undergoes is of course intimately linked with the experience of sexual function during this time which this thesis explores.

What this study confirms, is that for primiparous women pregnancy is a huge risk factor for the development of, or worsening of pre-existing, sexual dysfunction. The vast majority (86.1%) of primiparous women in this study were suffering from FSD by the third trimester of pregnancy. This value is higher than what is reported by other studies in the literature, which quote between 50-80%^{22,43,44,87,108-111}. The

improvement in the second trimester that has been reported by some previous studies^{38,41,109} was not observed in any of the FSFI scoring domains or the full scale score in this study, with only the only improvement in the second trimester being the percentage of women having sexual intercourse.

In the first trimester many women suffer from physical symptoms such as nausea and vomiting of pregnancy, breast sensitivity and a worsening sense of well-being. Some of these symptoms abate in the second trimester, which could explain the slight increase in women being sexually active, from 80.6% in the first to 87.5% in the second trimester. The third trimester sees more extreme physical and anatomical changes such as increased size of the abdomen, which can cause limitations to the sexual activity being performed, vaginal discharge, skin pigmentation and congestion and increased vaginal humidity, amongst others. Only one study has found any improvement in sexual functioning in the third trimester. Chang et al⁴⁴. reported an increase in sexual satisfaction in the last trimester, but this result has not been replicated in any other studies.

5.3.1 Limitations.

There are a number of limitations with this study. A major limitation is the fact that there is no pre-pregnancy data for these women. It is of course, very practically challenging to recruit a cohort of women before they are pregnant and then follow them throughout their pregnancy. Comments can therefore only be made on the change in sexual function that occur during pregnancy rather than the transition made from the before the onset of pregnancy. This is relevant as we know from other studies that pre-pregnancy FSD is a risk factor for FSD in pregnancy^{60,112,113}. Cross-sectional studies looking at the differences in sexual function in pregnant and non-pregnant states show that mean FSFI scores in pregnancy are lower than outside pregnancy^{113,114}. These studies mentioned are also not prospective, however. A study performed on identical twins by Botros et al⁷⁵ found that those who were nulliparous had better sexual functioning than their parous twins, again highlighting the role of parity in female sexual function. Another limitation of this study is that it also does not include any data from the women's sexual partners. There are even fewer studies looking at the effect of pregnancy on male sexual function. A study in Iran¹¹⁵ did find

a strong correlation between the changes seen in male and female sexual function during pregnancy. Again, there was little change in the first and second trimesters and then a significant decline in the third trimester.

There is also some inherent bias due to the fact that those who consented to be involved in the study are likely to share certain characteristics. Barrett et al²⁸ found that those who responded to their questionnaires on sexual health after childbirth, were more likely to be older, British, employed and married. The population served by the NNUH according to the 2011 census¹⁰⁰ is 87.2% white British, compared to 81.9% for the rest of the U.K. and so the population in this study may not reflect the rest of the country due to less ethnic diversity.

Women who had undergone in-vitro fertilisation (IVF) were also included in this study. This perhaps should not have been the case as studies have shown that IVF is an independent factor that negatively impacts of female sexual function⁴⁹.

There is also the question of whether the FSFI is appropriate for use in the pregnant population. The questionnaire was designed for, and has been validated in women who are not pregnant and so maybe the cut off scores used for FSD should not be the same in the pregnant population. The FSFI score does however allow good comparison between the three trimesters and that is of value in this study.

5.4 Conclusions.

In conclusion it is evident that for primiparous women pregnancy has a negative impact on sexual dysfunction with 86.1% of women be classified as suffering from FSD in the third trimester. The importance of sexual function in overall quality life is well known and so it is of paramount importance that this topic is discussed with women and their partners by their healthcare providers.

6 The Effect of Different Degrees of Perineal Trauma on Postnatal Female Sexual Function.

6.1 Introduction.

The literature review and methodology of this part of the study have previously been discussed in chapters 1 and 2 respectively and so will not be repeated here. This chapter will focus on the findings obtained from the study into the effect of different degrees of perineal trauma on postnatal female sexual function and then be followed by a discussion surrounding the results obtained.

This chapter will be divided into the following sections:

A description of:

- The results for the ‘control group’, who delivered by elective caesarean section and so sustained no perineal trauma.
- The results of the group who had episiotomies or second degree perineal tears.
- The results of the group who sustained OASIs.
- A comparison between the three groups.

6.2 Results.

6.2.1 Results for no perineal tear group.

There were 90 women recruited to the group of patients who had an elective caesarean section and so did not labour or sustain any perineal trauma. 15 of these women did not complete the questionnaire at three months and 14 women did not at six months postnatally.

Table 17. Three month data for no perineal tear group.

Domain	N	Median	Interquartile range
Desire	75	3.6	2.4 – 4.2
Arousal	75	4.2	3.0 – 4.8
Lubrication	75	4.2	2.1 – 4.8
Orgasm	75	4.4	2.8 - 5.2
Satisfaction	75	4	3.6 – 5.2
Pain	75	4.8	3.6 – 5.2
Full scale score	75	25.2	17.7 – 28.5

Table 18. Six month data for no perineal tear group.

Domain	N	Median	Interquartile range
Desire	76	4.8	3.6 - 5.6
Arousal	76	4.8	4.5 - 5.4
Lubrication	76	4.8	4.3 - 5.7
Orgasm	76	4.8	4.4 - 6.0
Satisfaction	76	5.2	4.4 - 5.6
Pain	76	5.6	4.8 - 6.0
Full scale score	76	30.9	27.1 - 33.5

When the data at three months postnatal is compared with the data at six months postnatal, it can be seen that the full scale score and the scores in all six domains of sexual function (desire, arousal, lubrication, orgasm, satisfaction and pain) are improved at the six months time point. The difference that is seen is also significant with all domains having a p value <0.0001.

Table 19. Comparison of three month vs six month data for no perineal tear group.

	N	Median	Interquartile range	P-value
Desire	71	-1.2	-1.2 - -0.6	<0.0001
Arousal	71	-0.6	-1.5 - -0.3	<0.0001
Lubrication	71	-0.6	-0.9 - -0.3	<0.0001
Orgasm	71	-0.4	-1.6 - 0	<0.0001
Satisfaction	71	-0.8	-1.2 - 0	<0.0001
Pain	71	-0.4	-1.2 - 0	<0.0001
Full Scale Score	71	-3.9	-6.8 - -1.7	<0.0001

Figure 9. Full scale scores three month vs six month in no tear group.

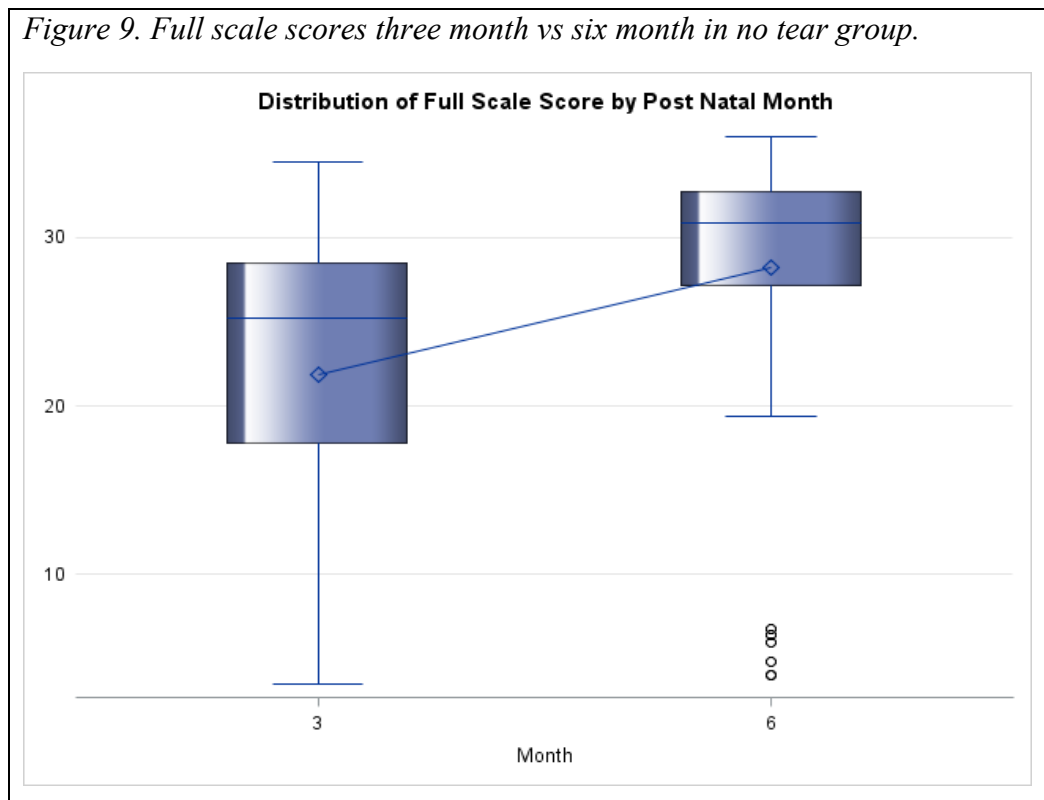


Figure 10. Desire scores three months vs six months in no tear group.

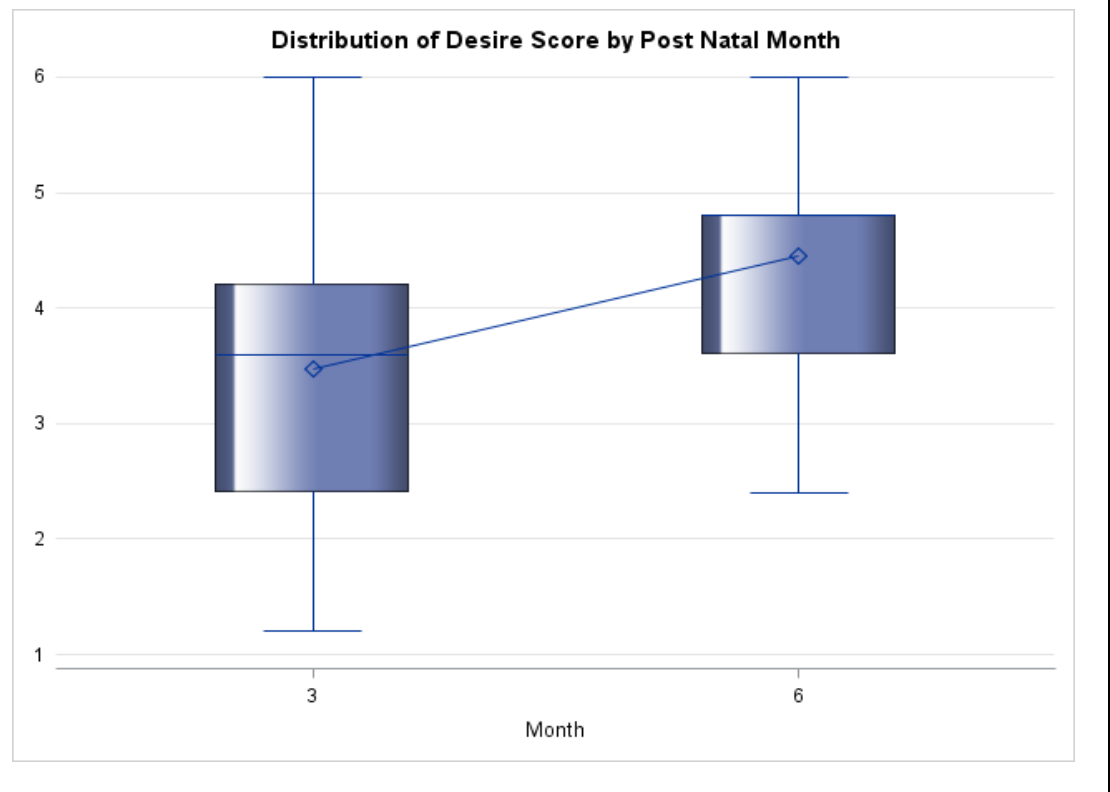


Figure 11. Arousal scores three months vs six months in no tear group.

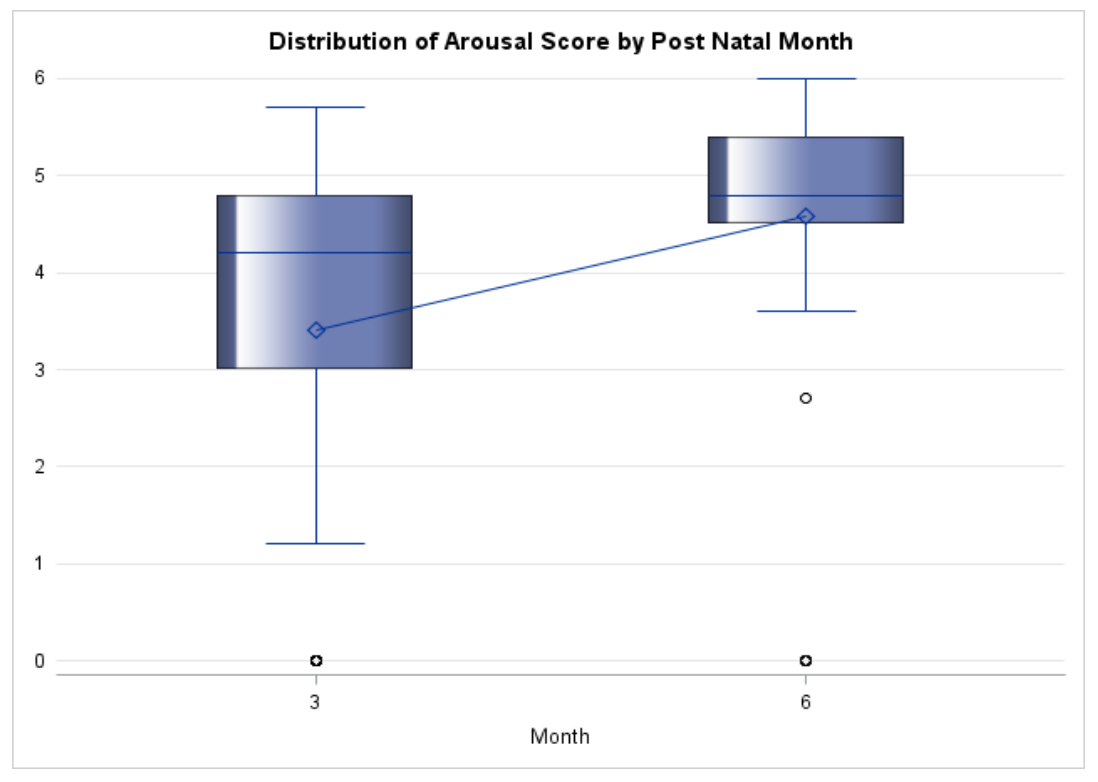


Figure 12. Lubrication scores three months vs six months in no tear group.

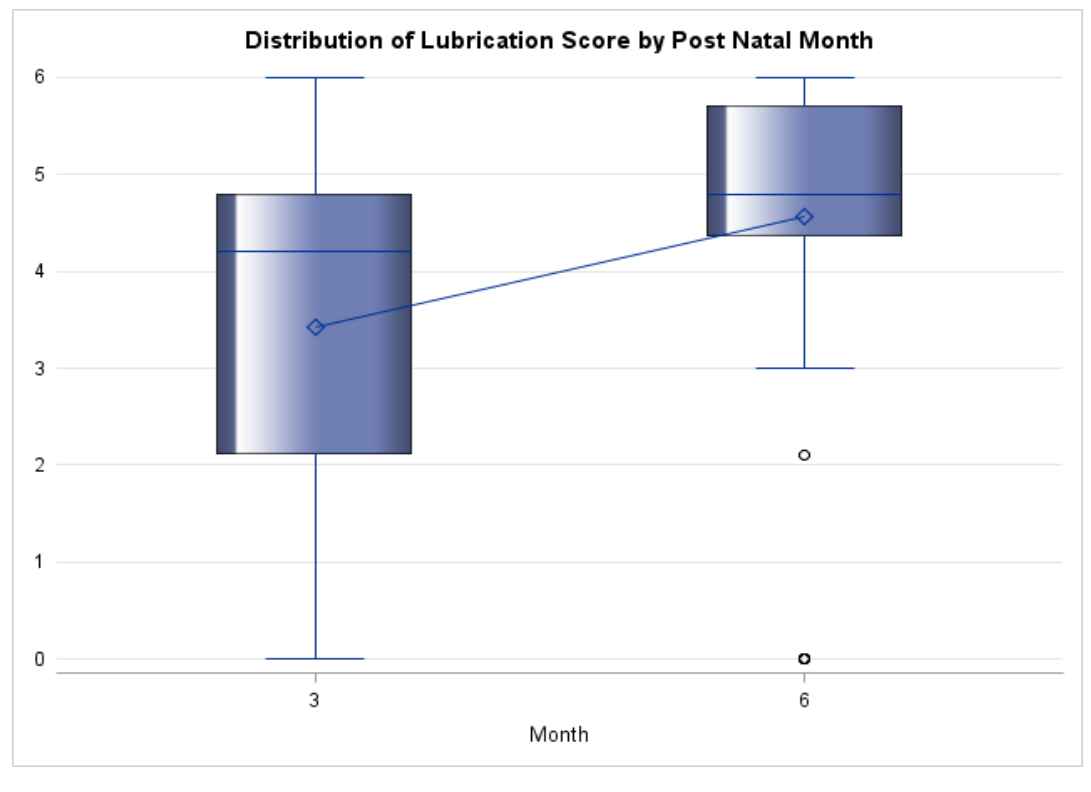


Figure 13. Orgasm scores three months vs six months in no tear group.

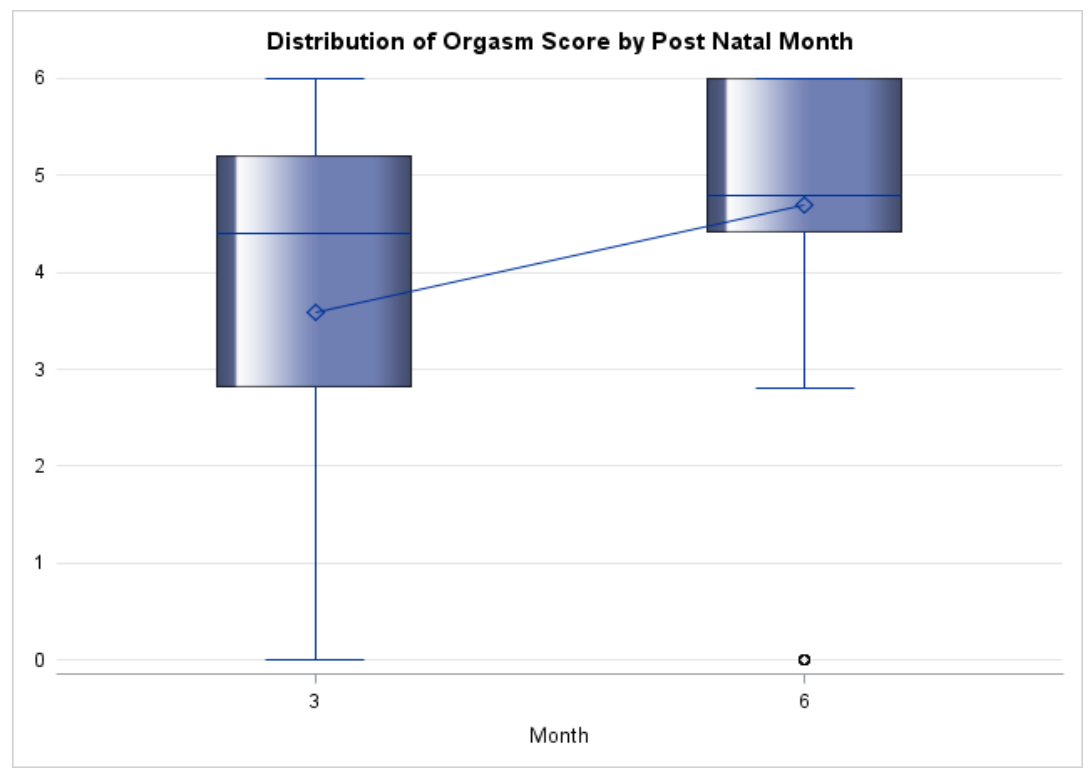


Figure 14. Pain scores three months vs six months in no tear group.

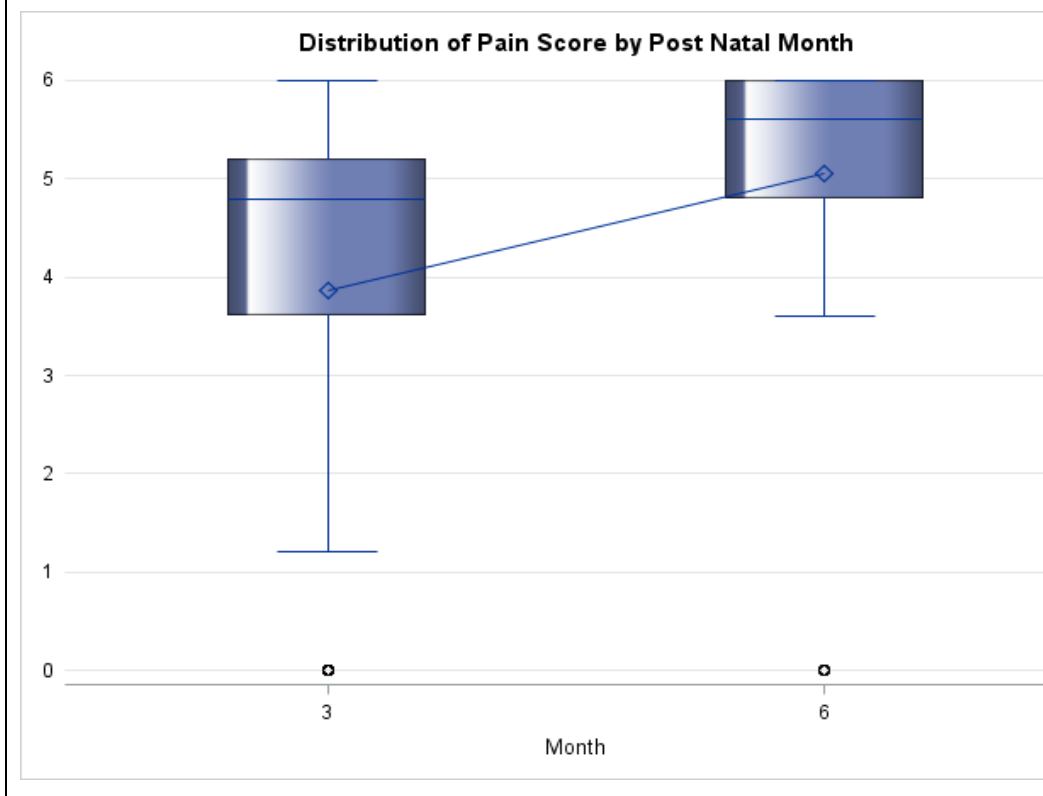
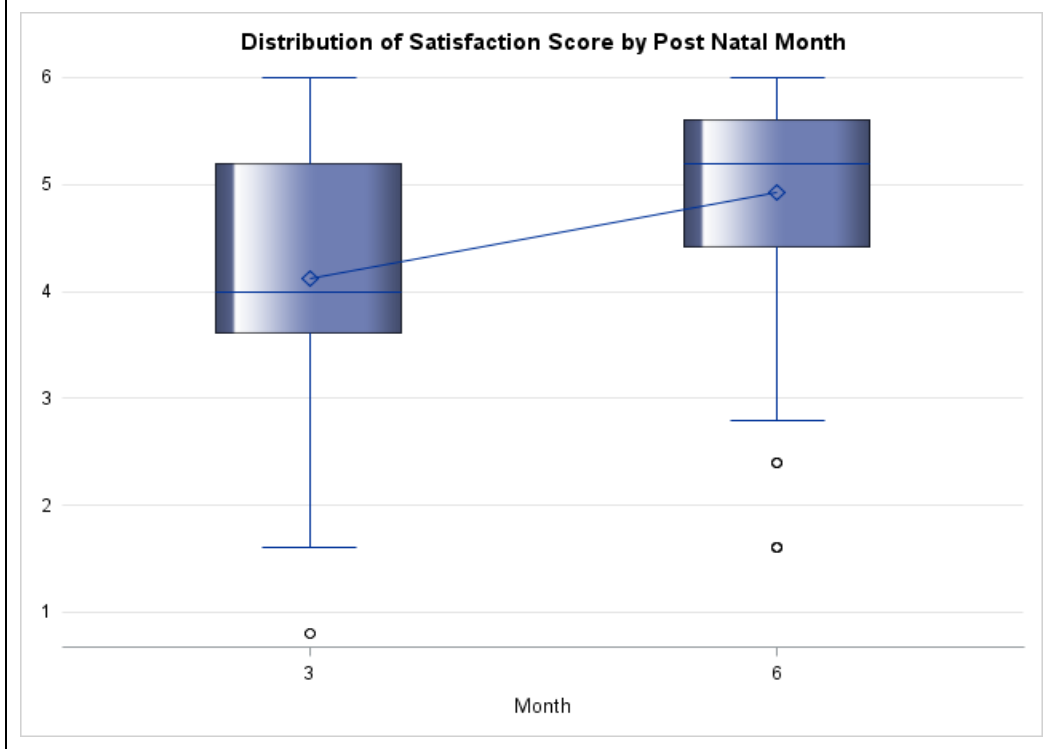


Figure 15. Satisfaction scores three months vs six months in no tear group.



6.2.2 Results for episiotomy/ second degree tear group.

90 women were recruited the episiotomy and second degree tear group. 19 participants were lost to follow up at three months postnatally and 15 did not reply at six months postnatally.

Table 20. Three month scores for episiotomy/ second degree tear group.

	N	Median	Interquartile range
Desire	71	3	2.4 - 3.6
Arousal	71	3.6	3 - 4.5
Lubrication	71	3.9	2.7 - 4.5
Orgasm	71	3.6	2.8 - 4.4
Satisfaction	71	4	3.2 - 4.4
Pain	71	4.4	3.2 - 4.8
Full scale score	71	22.9	17.0 - 26.3

Table 21. Six month data for episiotomy/ second degree tear group.

	N	Median	Interquartile range
Desire	75	3.6	3.0 - 4.2
Arousal	75	4.5	3.6 - 4.8
Lubrication	75	4.5	3.9 - 5.1
Orgasm	75	4.8	4.0 - 5.6
Satisfaction	75	4.8	3.6 - 5.2
Pain	75	5.2	4.0 - 5.6
Full scale score	75	27.6	23.0 - 30.2

All six domains and the full scale score improved from three months to six months postnatally. The difference in all cases was also significant, with $p < 0.0001$.

Table 22. Three months vs six months scores for episiotomy/ second degree tear group.

	N	Median	Interquartile range	P-value
Desire	69	-0.6	-1.2 - 0	<0.0001
Arousal	69	-0.6	-1.2 - -0.3	<0.0001
Lubrication	69	-0.9	-1.5 - -0.3	<0.0001
Orgasm	69	-0.4	-1.6 - 0	<0.0001
Satisfaction	69	-0.8	-1.2 - 0	<0.0001
Pain	69	-0.8	-1.2 -0.4	<0.0001
Full Scale Score	69	-4.2	-6.3 - -2.3	<0.0001

Figure 16. Full scale scores three months vs six months in episiotomy/ second degree tear group.

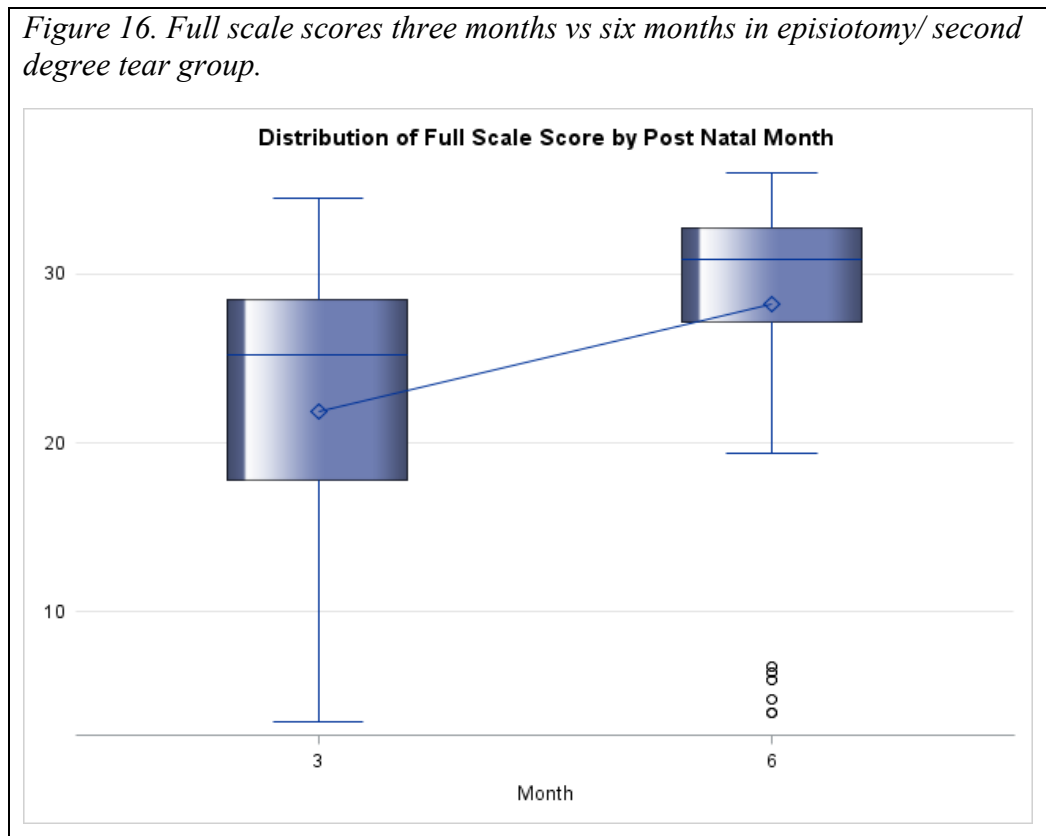


Figure 17. Desire scores three months vs six months in episiotomy/ second degree tear group.

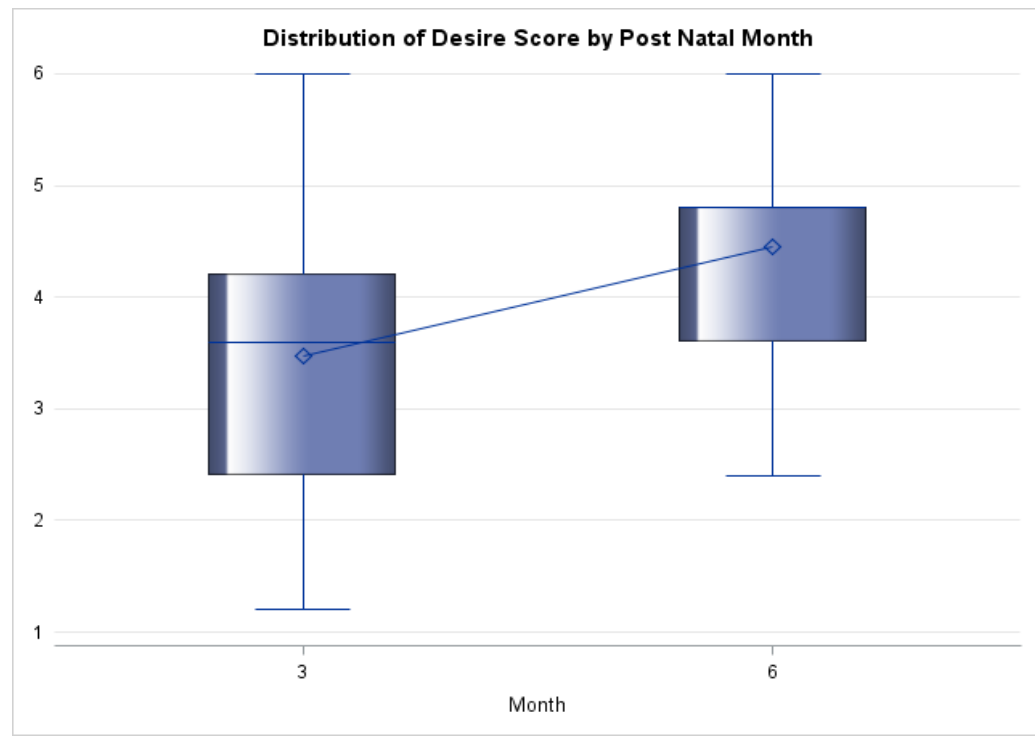


Figure 18. Arousal scores three months vs six months in episiotomy/ second degree tear group.

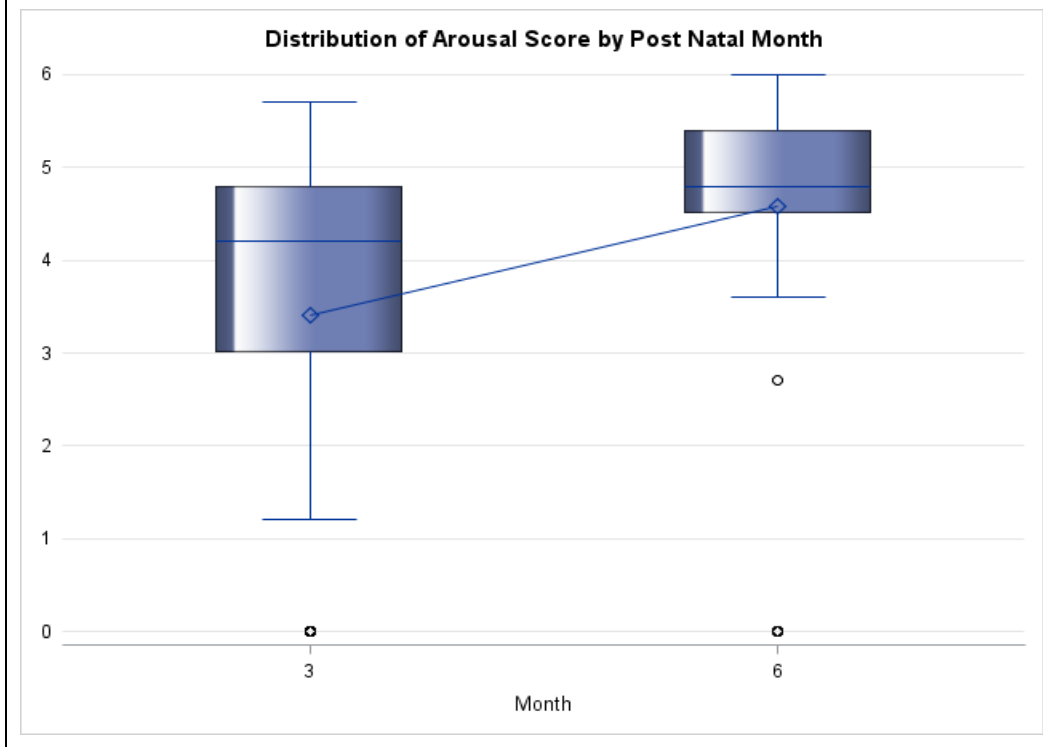


Figure 19. Lubrication scores three months vs six months in episiotomy/ second degree tear group.

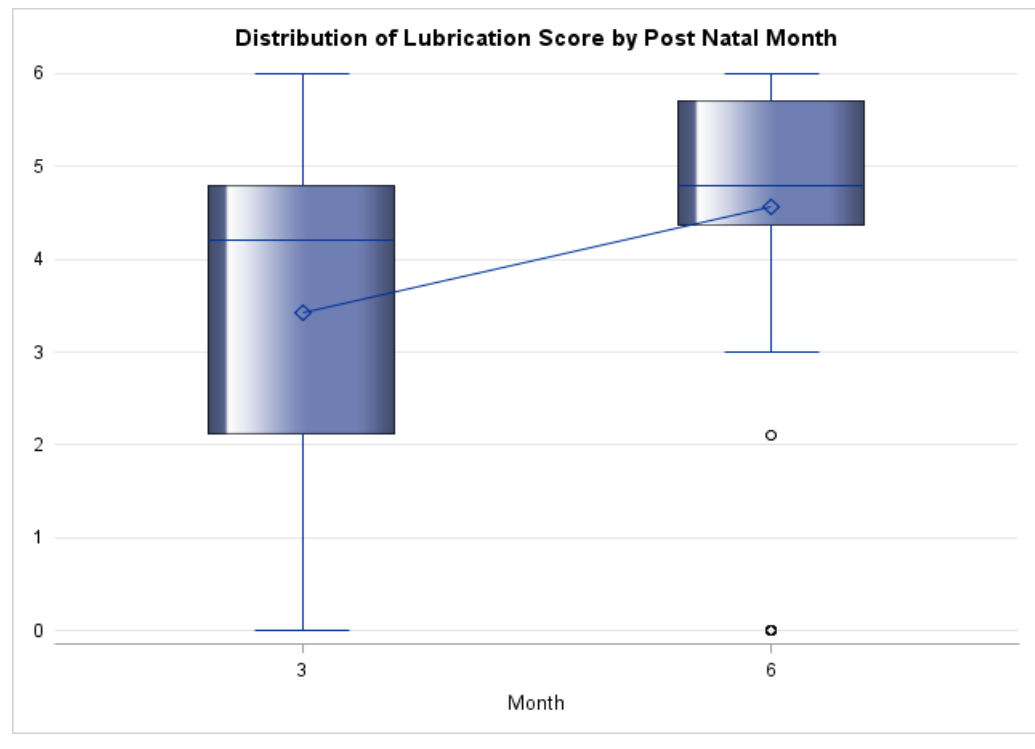


Figure 20. Orgasm scores three months vs six months in episiotomy/ second degree tear group.

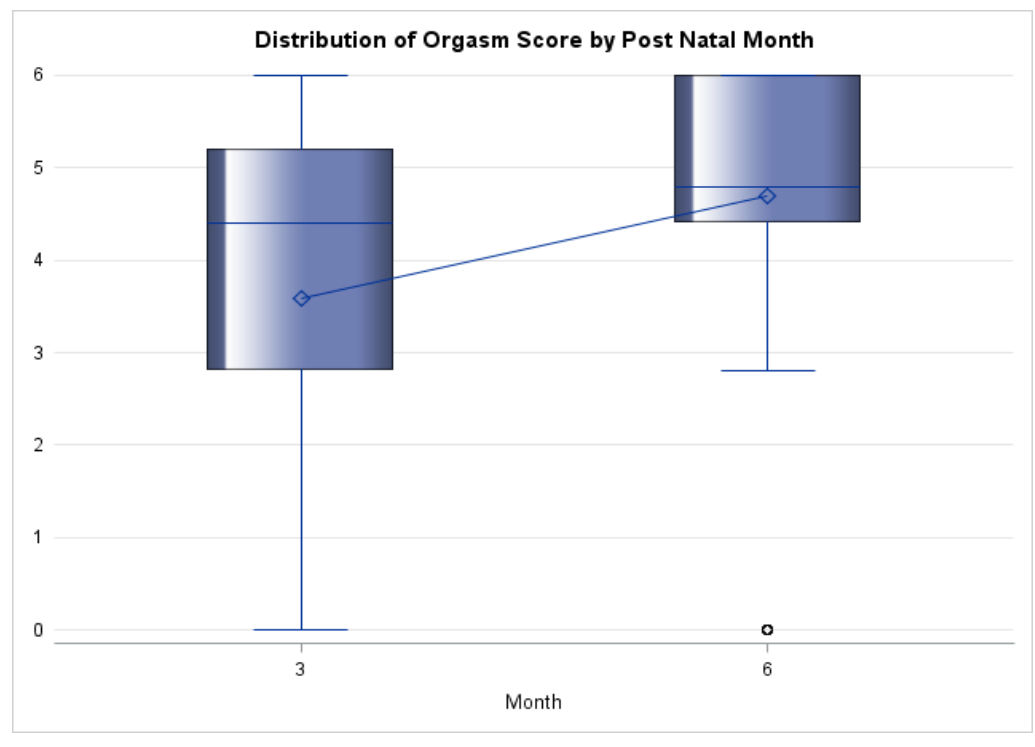


Figure 21. Satisfaction scores three months vs six months in episiotomy/ second degree tear group.

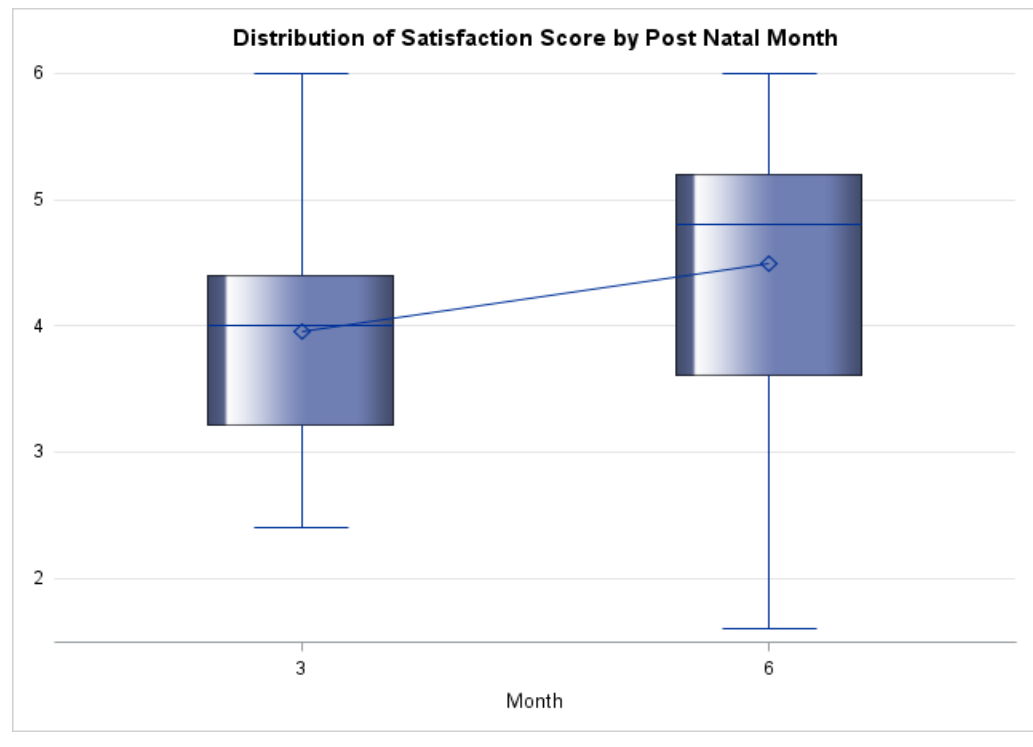
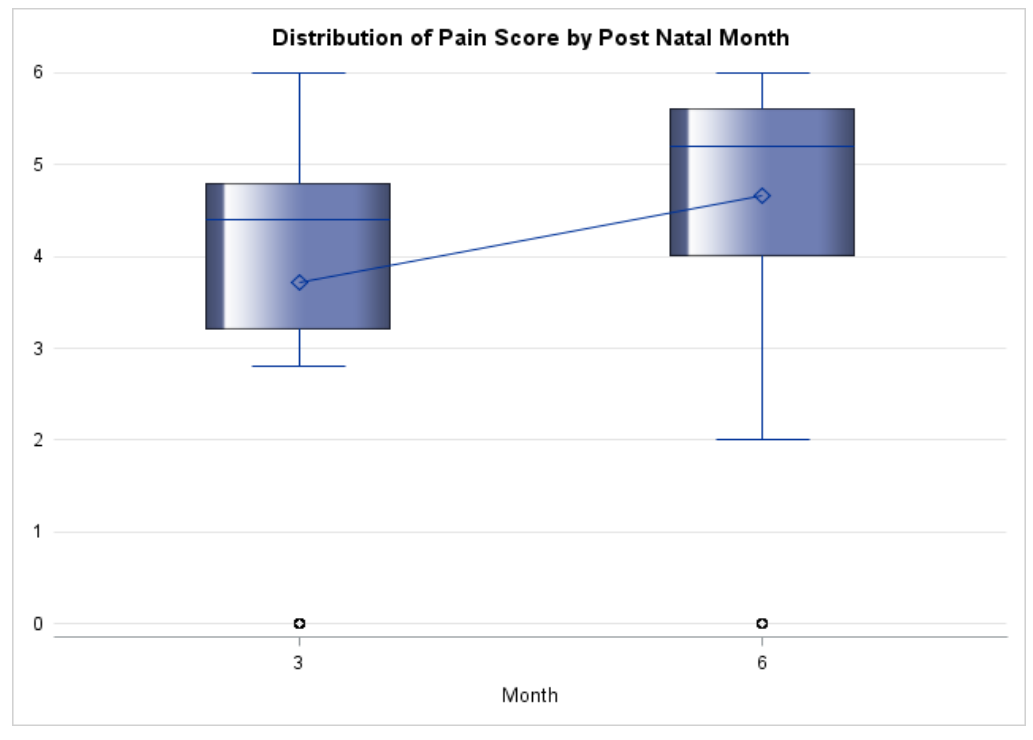


Figure 22. Pain scores three months vs six months in episiotomy/ second degree tear group.



6.2.3 Results for OASIS tear group.

90 women were recruited to the OASI study group. 46 had 3a tears, 35 had 3b tears, five had 3c tears and four had 4th degree tears. Five did not complete the questionnaire at three months and five did not complete it at six months postnatally.

Table 23. Three month data for OASI group.

Domain	N	Median	Interquartile range
Desire	85	2.4	2.4 - 3.6
Arousal	85	1.5	0 - 3.9
Lubrication	85	1.5	0 - 4.8
Orgasm	85	1.2	0 - 4.4
Satisfaction	85	2.8	1.6 - 4.4
Pain	85	1.2	0 - 4.8
Full scale score	85	10.5	5 - 25.1

Table 24. Six month data for OASI group.

Domain	N	Median	Interquartile range
Desire	85	4.8	3.6 - 4.8
Arousal	85	4.8	3.6 - 5.7
Lubrication	85	4.8	3.6 - 6.0
Orgasm	85	5.2	3.6 - 6.0
Satisfaction	85	5.2	4.4 - 6.0
Pain	85	4.8	3.6 - 6.0
Full scale score	85	30.4	22.2 - 32.8

As seen in the two previous groups all six domain scores and the full scale score were significantly improved at six months compared to three months postnatally ($p < 0.0001$) for women who had sustained an OASI at delivery.

Table 25. Three months vs six month data for OASI group.

	N	Median	Interquartile range	P-value
Desire	83	-1.2	-2.4 - -1.2)	<0.0001
Arousal	83	-2.1	-4.2 - -0.9	<0.0001
Lubrication	83	-1.5	-3.6 - 0	<0.0001
Orgasm	83	-1.6	-4.4 - 0	<0.0001
Satisfaction	83	-2.0	-2.8 - 0	<0.0001
Pain	83	-1.6	-4 - 0	<0.0001
Full Scale Score	83	-10.9	-21.5 - -3.3	<0.0001

Figure 23. Full scale scores three months vs six months in OASI group.

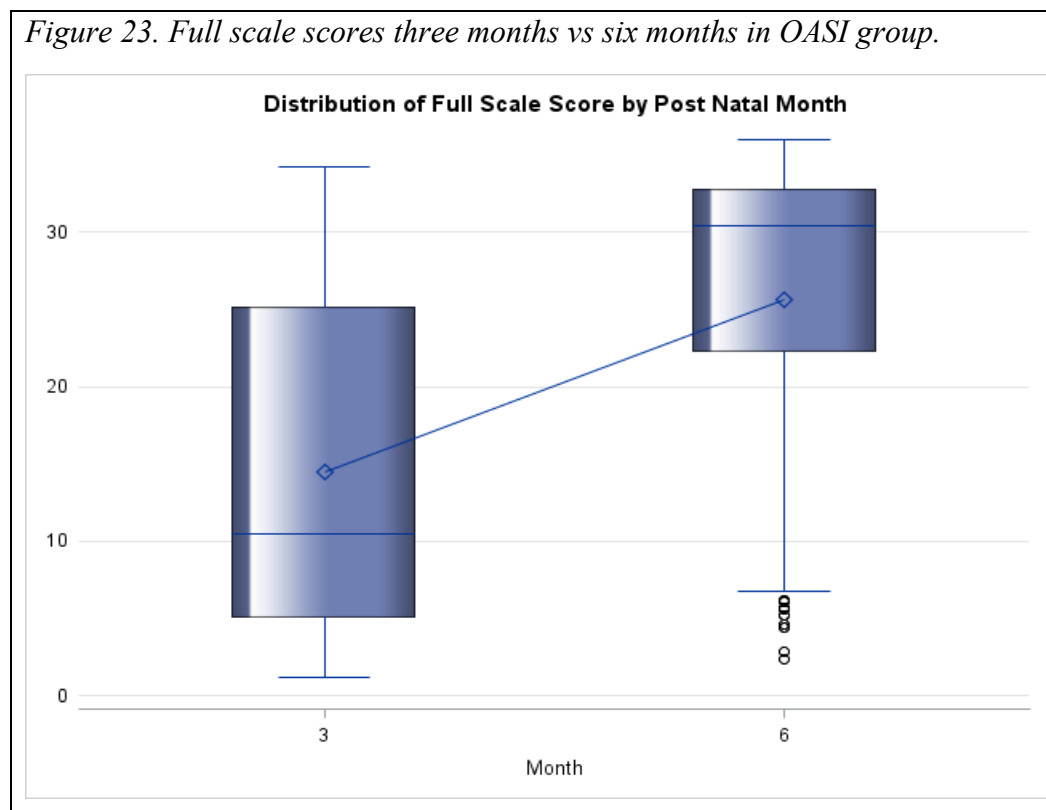


Figure 24. Desire scores three months vs six months in OASI group.

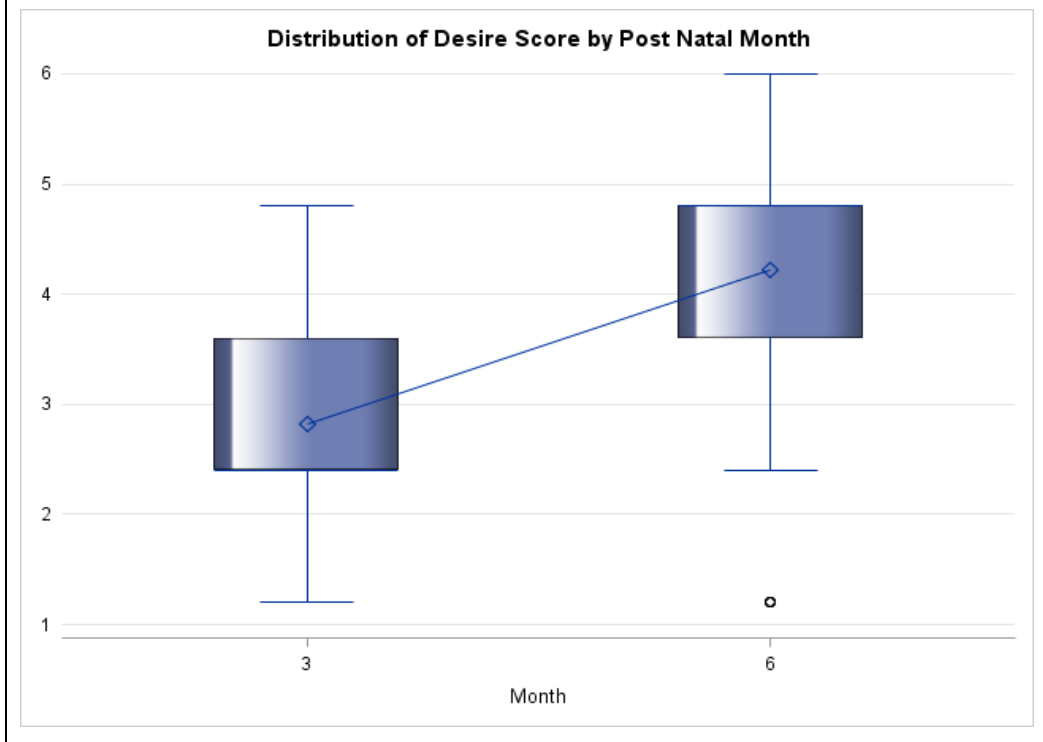


Figure 25. Arousal scores three months vs six months in OASI group.

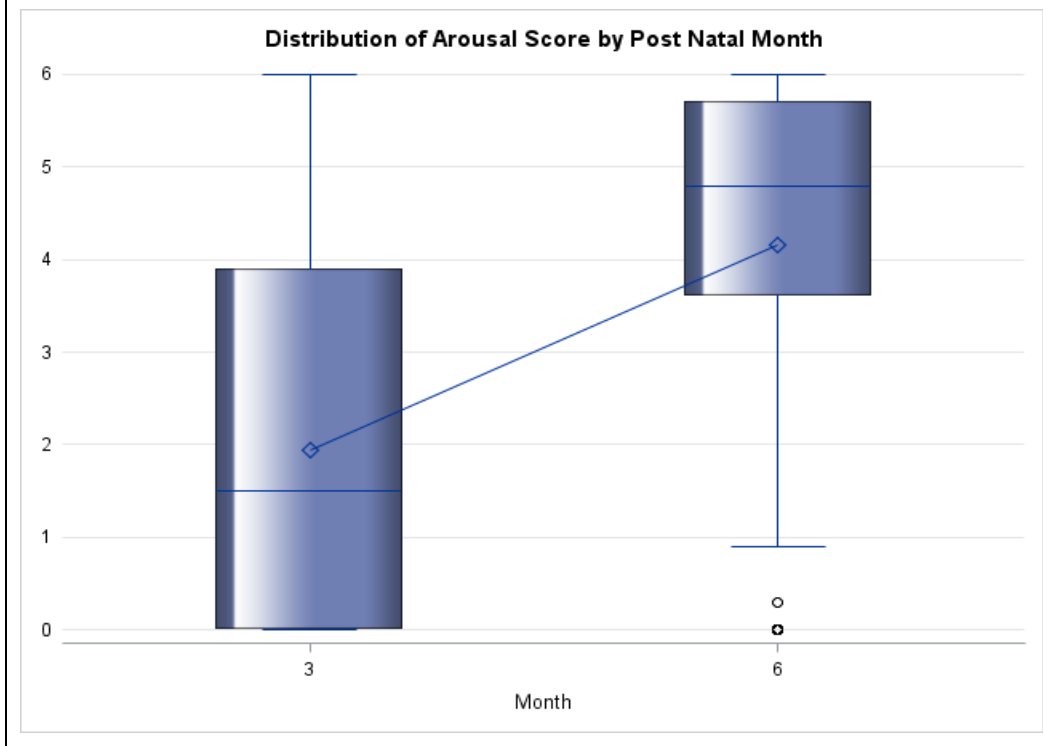


Figure 26. Lubrication scores three months vs six months in OASI group.

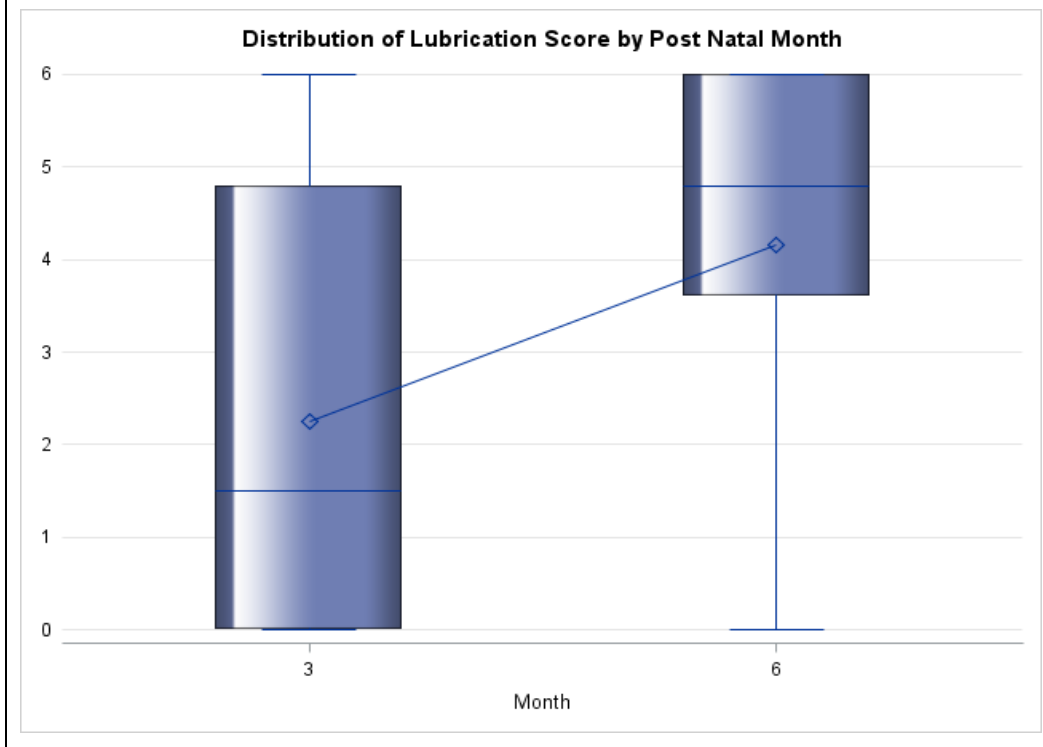


Figure 27. Orgasm scores three months vs six months in OASI group.

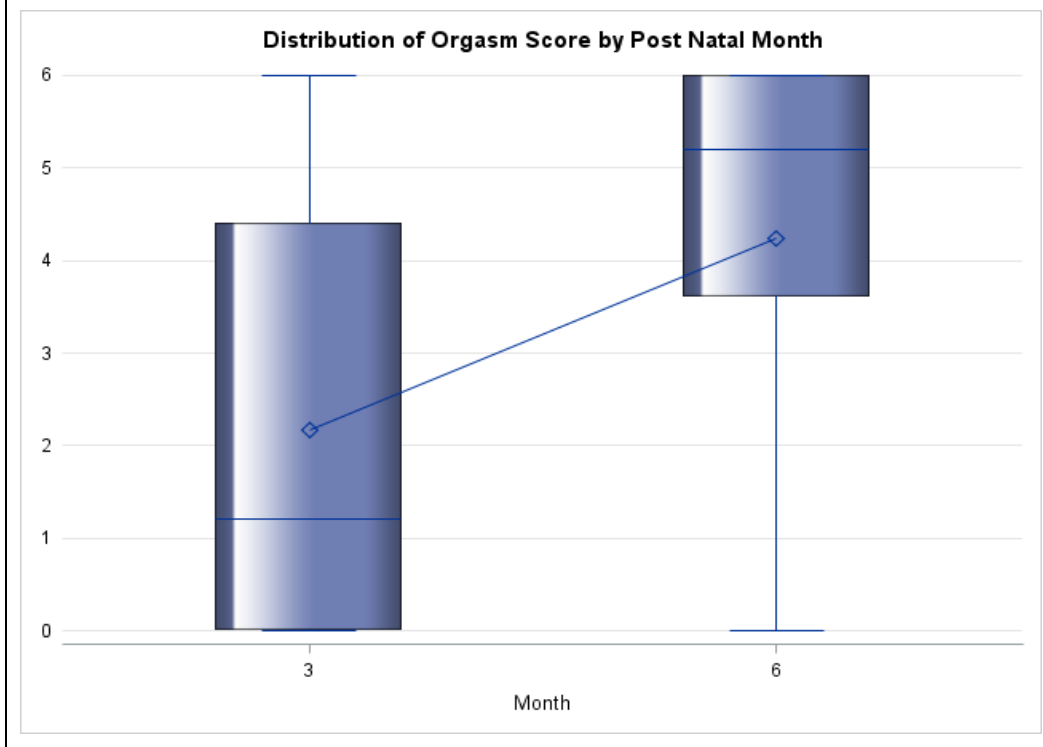


Figure 28. Satisfaction scores three months vs six months in OASI group.

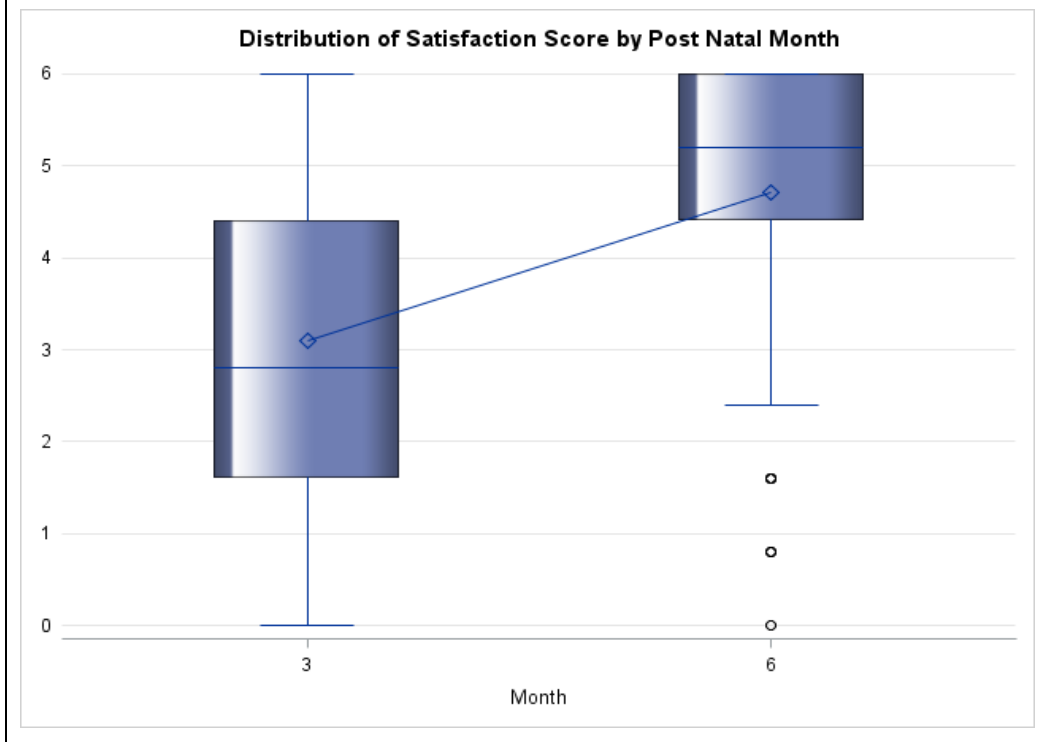
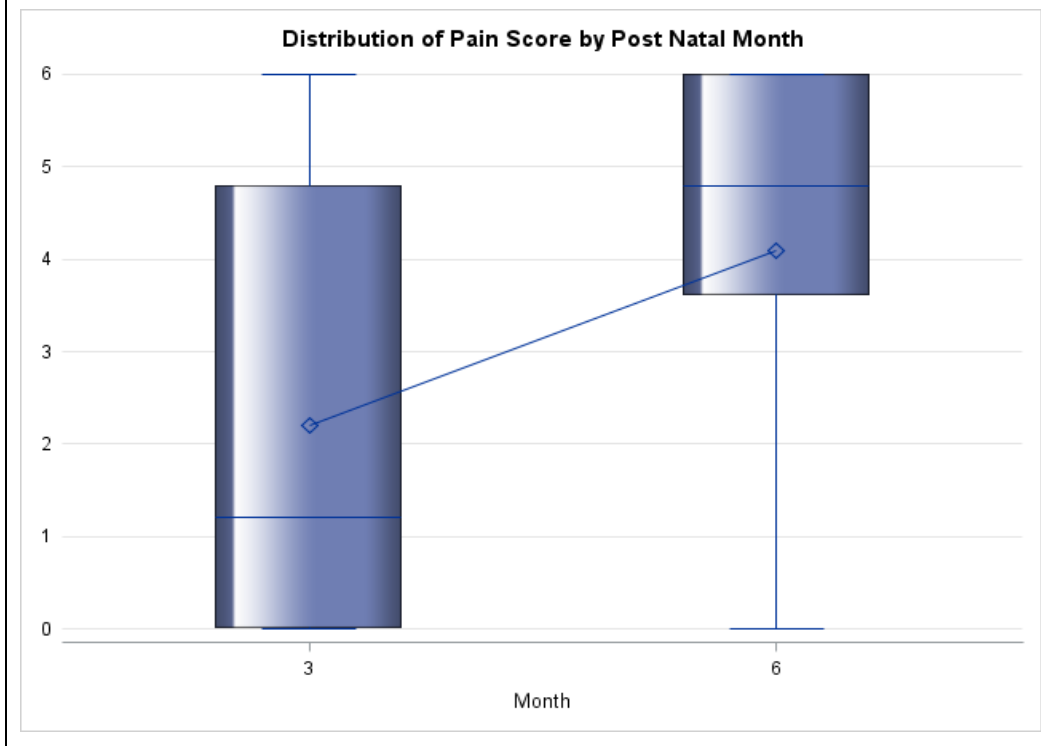


Figure 29. Pain scores three months vs six months in OASI group.



6.2.4 Comparison of the different degrees of OASI.

A Kruskal Wallis test, a non-parametric one way analysis of variance was performed to see if there was a difference in results obtained in between the different degrees of OASI (3a, 3b, 3c and 4th). For all measures there was no statistically significant differences between the tears and so further pairwise comparisons were not performed.

6.2.5 Comparison of the three groups of perineal tears.

Table 26. Percentage of women not having sexual intercourse in each group.

Tear	3 months (%)	6 months (%)
None	23.9	8.5
2nd/ Episiotomy	14.5	8.7
OASI	50.0	15.5

It can be seen from the above table that the percentage of women having sexual intercourse at six months is dramatically increased for all three groups when compared to the three month data and is statistically significant ($p < 0.05$). At three months those women who had an episiotomy were most likely to be having sexual intercourse with only 14.5% not having intercourse, compared to 23.9% and 50% for the caesarean section group and the OASI groups respectively. By six months there was virtually no difference in numbers of women not engaging in sexual activity between the caesarean section and episiotomy/second degree tears groups (8.5% and 8.7% respectively). The OASI group however still had a higher rate though, of 15.5%.

Using the standard cut of score for diagnosing FSD of 26.5 rates of sexual dysfunction were calculated. The results for FSD again improved from three months to six months postnatally in all three groups. Rates were fairly similar between all the groups at three months; 77.6 % in the OASI group, 76.1% in the episiotomy/second degree tear group and the lowest in the caesarean section group at 62.7%. By six months postnatally the differences between the groups were slightly bigger. The caesarean section group still had the lowest percentage

of FSD at 22.4%. The episiotomy and second degree tear group actually had the highest rates of 45.3 % compared to 35.3% in the OASI group.

Table 27. Percentage of women meeting criteria for FSD in each group.

Tear	3 months (%)	6 months (%)
None	62.7	22.4
2nd/ Episiotomy	76.1	45.3
OASI	77.6	35.3

A Kruskal Wallis test was performed to test if there was any significant difference between the three groups in the six domain scores at each time point. A significant difference was found between the groups in all domains (apart from lubrication at six months) and for the full scale score.

Table 28. Three month vs six month data.

Outcome	Variable	p Value
Desire	3 months	0.0028
Desire	6 months	<.0001
Arousal	3 months	<.0001
Arousal	6 months	0.008
Lubrication	3 months	0.0061
Lubrication	6 months	0.1709
Orgasm	3 months	0.0005
Orgasm	6 months	0.0451
Satisfaction	3 months	0.0001
Satisfaction	6 months	0.0099
Pain	3 months	<.0001
Pain	6 months	0.0055
Full scale score	3 months	<.0001
Full scale score	6 months	0.0016

Below empirical distribution plots are shown to look at the differences between the three groups in the full scale scores. There is a small difference between the episiotomy/second degree tear group and the caesarean section group. There is a statistically significant difference between the full scale FSFI scores for the

OASI group compared to the other two groups at both three and six months postnatally.

Figure 30. Full scale scores at three months.

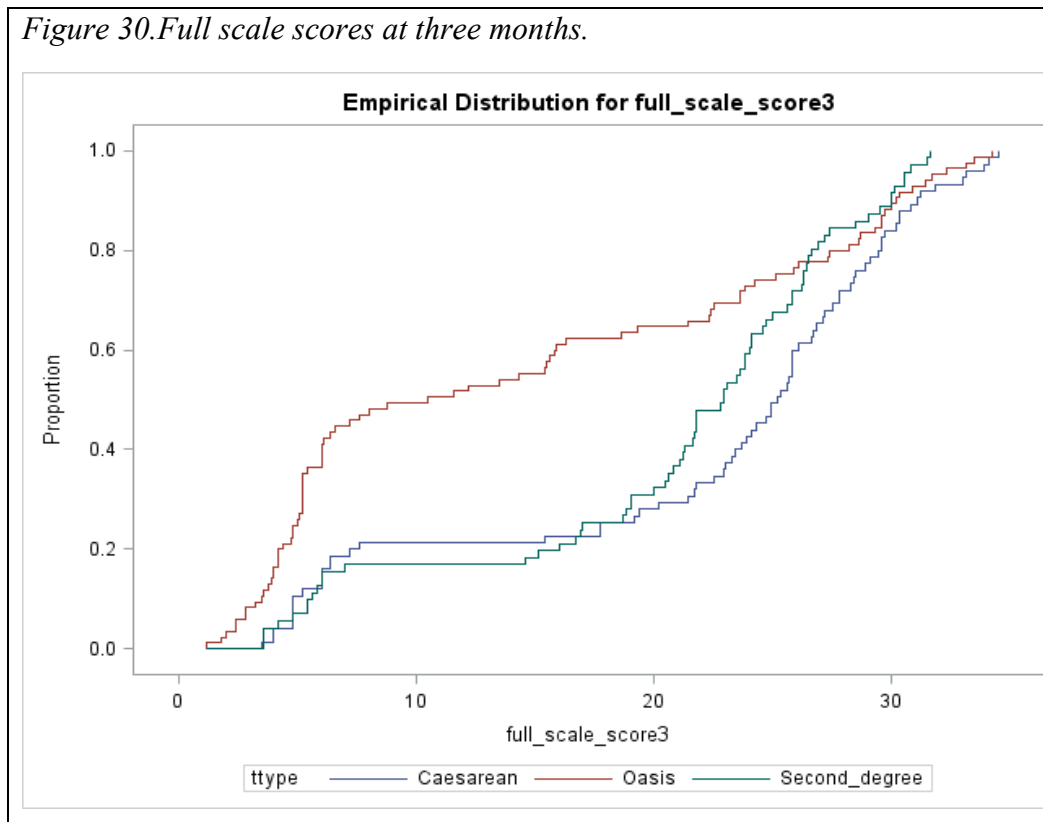
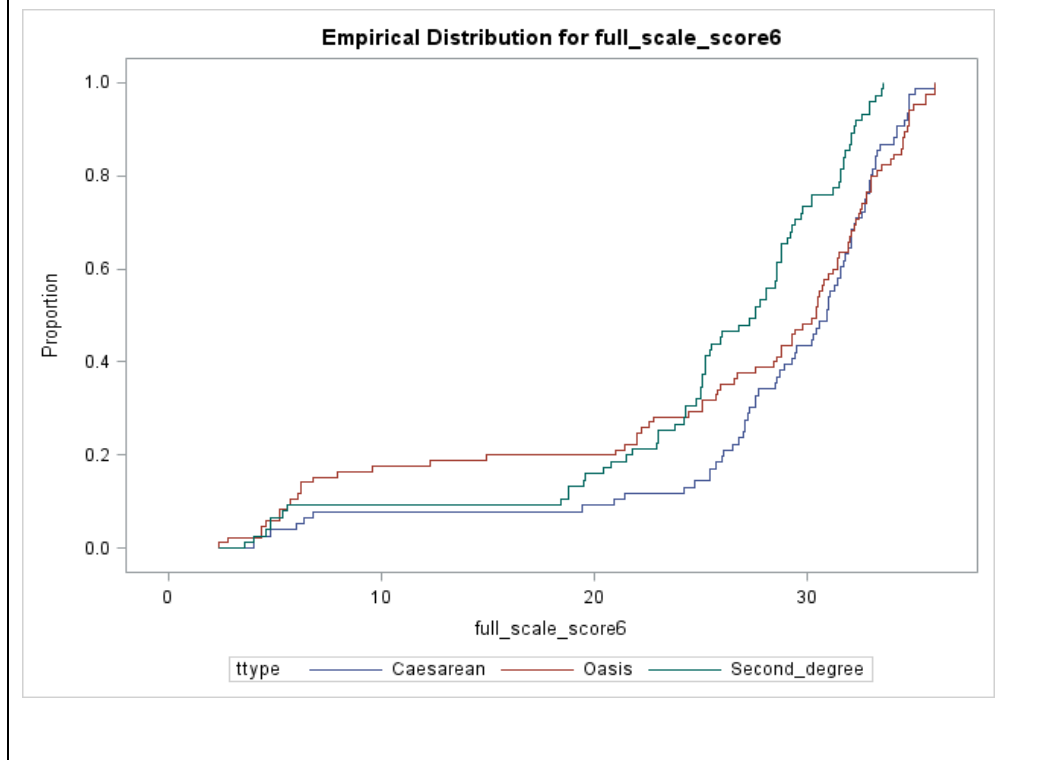


Figure 31. Full scale scores at six months.



6.3 Discussion.

The results from this study show that across all six domains and full scale scores and in all three study groups sexual function is improved at six months compared to three months postnatally and that this difference was statistically significant. FSD rates are lowest in the women who had no perineal trauma at both the three and six month time points. The highest rates of FSD at three and six months postnatally were found in the OASI and second degree/ episiotomy groups respectively. The percentage of women engaging in sexual intercourse was statistically significantly higher in all groups at three months compared to six months. The no perineal tear group had the highest percentage of women engaging in sexual activity at three and six months postnatally, although the difference with the second degree tear/ episiotomy group was statistically insignificant at six months. The OASI group had the highest percentage of women not engaging in sexual activity at both three and six months postnatally.

From these findings it is evident that there is a very high rate of FSD in the postnatal period. The rate of FSD vary between 62.7% and 77.6% at three months and then drop to between 22.4% and 35.3% at six months postnatal. Other studies have reported levels of “sexual health issues” at six months to be around 50%²⁸ and 37%⁵⁶.

The proportion of women not engaging in sexual intercourse was highest in the OASIS group, with 50% of women still not having had sex at three months and 15.5% at six months postpartum. Given that the incidence of OASIs is rising in the UK¹¹⁶ it is important that this information is given to patients so they are aware of what to expect in the postnatal period. The exact reasons for the increase in third and fourth degree perineal tears from 1.8% in 2000 to 5.9% in 2012¹¹⁷ it not entirely clear but may be in part due to an increase in maternal weight and thus higher birthweights as well as perhaps an increased rate of detection of OASIS¹¹⁸.

Vaginal delivery can cause vascular nerve damage as well as compression or stretching of nerves which would give an anatomical explanation for the differences in sexual function seen between those with perineal trauma and those without. Nerve injury caused during perineal trauma may well result in difficulty with sensation, arousal and orgasm⁷⁰. The pudendal nerve is involved in sexual pleasure responses^{51,119}, and thus damage to it during delivery would result in decreased sexual satisfaction. The role of pelvic floor muscle strength in sexual functioning is less clear. Studies have shown a significantly lower pelvic floor muscle strength in women who have delivered vaginally compared to those delivered by caesarean section but despite this, here was no correlation between sexual function and pelvic muscle strength¹²⁰.

When addressing the topic of female sexual function post-natally it is important to consider what constitutes normal postpartum sexual function. This is very difficult to answer as validated values for FSD are all based on the non- pregnant or non- post-partum population and perhaps we should not be using these standards when judging this cohort. Wiegel et al¹²⁴ have even argued that the FSFI is primarily a screening tool and should not be used as the sole tool to

diagnose sexual dysfunction. It does remain however the most widely used and validated assessment tool and so is appropriate to use in the research setting. It also worth considering whether it is appropriate to compare data generated now with data collected even twenty years ago as women as more willing to discuss their sexual function than ever before^{125,126}.

6.3.1 Limitations

This study suffers from a few limitations. Firstly, information regarding these women's sexual functioning outside of pregnancy is missing. Pre-existing dyspareunia before pregnancy is likely to be a big risk factor for the development of postnatal FSD and several studies have reported on this¹²⁷. Unfortunately obtaining this data is technically very challenging as would require following a large cohort of nulliparous women over many years waiting for them to get pregnant and deliver. A lot of the data that exists on the effect of pre-pregnancy sexual function therefore comes from patients recall, which decreases the reliability of results obtained.

There is no data from the partner in our study. The purpose of this study was to look at female sexual functioning however the role of the partner is of course very important especially for psychological factors and relationship well-being. Gungor et al¹²⁸ looked at 107 men and found no difference on their sexual functioning when compared to their partner's mode of delivery. There is also no distinction made in this study between heterosexual and homosexual relationships and this may be an over-sight as perineal trauma may have less of an impact on FSD in same sex relationships. An Australian study looking at the first year postpartum did find a difference with same sex relationships, finding that women who were in a same-sex relationship were less likely to have relationship dissatisfaction^{129,130}.

In this study all OASI have been grouped together as the numbers of major OASI (3c and 4th degree tears) were very small (5 and 4 respectively). Other studies looking at the recovery following OASI have found the functional prognosis for those tears involving only the EAS (3a and 3b) is much better than

those also involving the IAS (3^c and 4th)^{121–123}. It is therefore likely that the sexual functioning would also be significantly better in the minor OASI group, but the small numbers in this study made it difficult to draw any conclusions.

Many factors in the postnatal period will play a role on female sexual function at this time. We know that hormonal changes that occur in the post-partum period, as well as changes caused by breastfeeding, can result in decreased desire, arousal and lubrication¹³¹. Data regarding breastfeeding status was not collected in this study which is a known confounder. Postnatal mental health was also not taken into consideration as the FSFI does not ask any questions regarding it and there is much documented on the negative effect of postnatal depression on female sexual function^{132–134}. This is a good example of how this study would have benefitted from having a qualitative element to it, such as via structured interviews in order to include other aspects not covered by the FSFI. Another possible cause of change in sexual function is medication¹²⁶. We know from studies that all antidepressants with serotonergic activity can cause mild to severe sexual dysfunction such as decreased libido and delayed orgasm frequently or anorgasmia and arousal difficulties^{52,77} and so their effects should also be taken into consideration.

Another limitation to this study is that although the control group had no perineal trauma, they did have a caesarean section, which some studies have found is itself a risk factor for postnatal FSD^{135–137} on the other hand some studies found caesarean section to be protective against FSD⁵⁶. This was done because a very small number (around 9.6%) of primiparous women deliver without sustaining perineal trauma¹³⁸, thus getting sufficient numbers would have been difficult. Another alternative could have been to use women with no perineal and first degree perineal tears as the control group but these women would have still undergone some degree of perineal trauma and were thus considered to be less representative of a “control” group.

Another limitation is the fact that follow up was only for six months. This was done for practical reasons however it does impact on the long term conclusions

that can be reliably drawn from this study. De Souza et al^{32,45,139} found that sexual function did improve between six and twelve months post-natally regardless of type of perineal trauma sustained. Given that data surrounding long term implications of perineal trauma are very variable it is still relevant to look at the six month postnatal time point.

6.4 Conclusion.

In conclusion female sexual function improves significantly between three and six months postnatally. FSD rates are lowest and sexual activity rates are highest in the women who had no perineal trauma at both the three and six month time points. The highest rates of FSD at three and six months postnatally were found in the OASI and second degree/ episiotomy groups respectively. More work is needed to look at the longer term implications of perineal trauma on female sexual functioning.

7 Doctors' Attitudes Towards Female Sexual Function in the Antenatal and Postnatal Periods.

7.1 Introduction.

The preceding chapters of this thesis have looked at the maternal impact of pregnancy. They have examined what role pregnancy itself and the degree of perineal trauma sustained during childbirth, have on female sexual function. The information gleaned from this is of intellectual interest and is thought provoking, however its usefulness in healthcare and its direct impact on women's health resides in how such information can be put into practice. If such knowledge is to be used and disseminated, it has to be a topic that is discussed amongst health professionals and their patients and one that is felt to be important by women's health physicians. The aim of this part of the study was to examine how doctors in antenatal clinics, general gynaecology clinics and within the post-natal review settings were approaching the topic of female sexual functioning.

The literature review and methodology of this part of the study have previously been discussed in chapters 1 and 2 respectively and so will not be repeated here. This chapter will present and analyse the results obtained and discuss the findings.

7.2 Results.

The survey was sent to 437 doctors and the survey monkey was live for a time period of one year. 92 responses were received in total, giving a response rate of 21.1%.

7.2.1 Demographics.

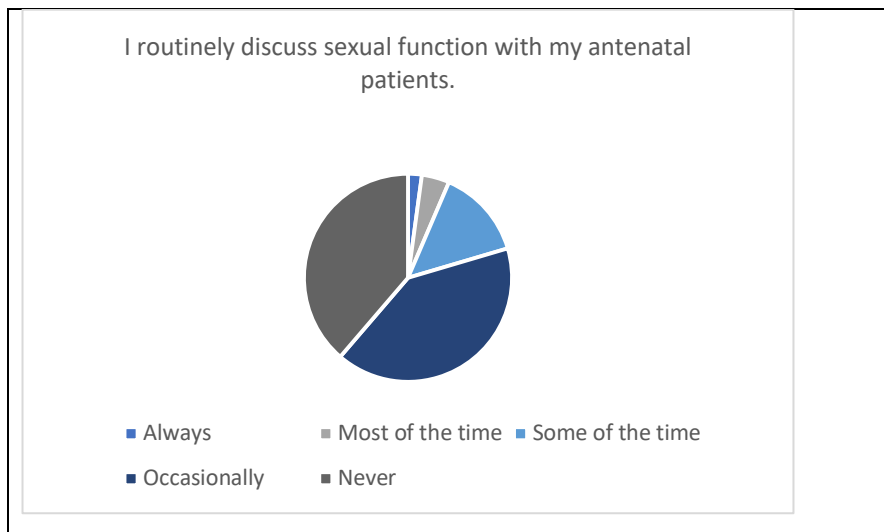
The demographics of the doctors' surveyed were as follows: 71% were female, 27% were male and 2% preferred not to say. 57% were aged 30-40 years, 21% 40- 50 years, 13% under 30 years and 9% over 50 years-old. 41% were working

at registrar level, 27% at consultant level, 21% as senior house officers (SHO) and 10% as clinical fellows.

7.2.2 Antenatal assessment of sexual function.

In response to the statement “I routinely discuss sexual function with my antenatal patients” 40.9% of respondents replied ‘occasionally’, 38.7% ‘never’, 14.0% ‘some of the time’, 4.3% ‘most of the time’ and only 2.2% ‘always’.

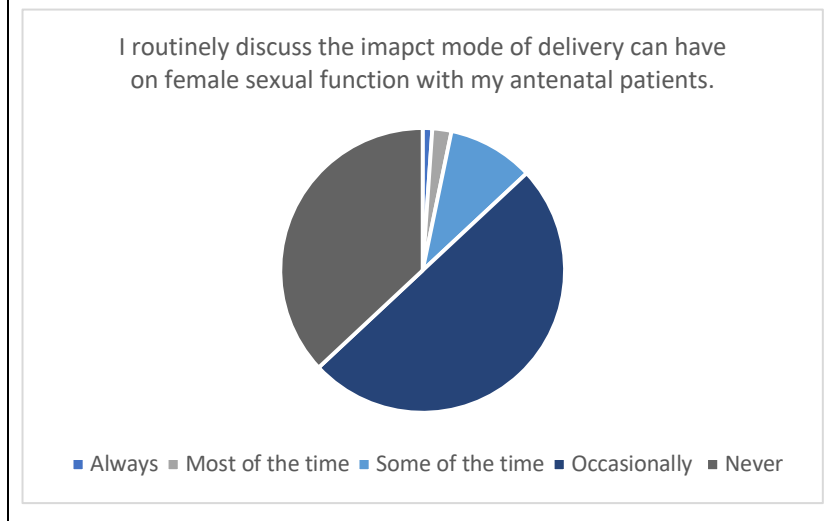
Figure 32. Assessment of antenatal sexual function.



7.2.3 Effect of mode of delivery on sexual function.

When asked if the impact that mode of delivery can have on female sexual function is discussed with antenatal patients 50% replied ‘occasionally’, 37% ‘never’, 9.8% ‘some of the time’, 2.2% ‘most of the time’ and 1.1% ‘always’.

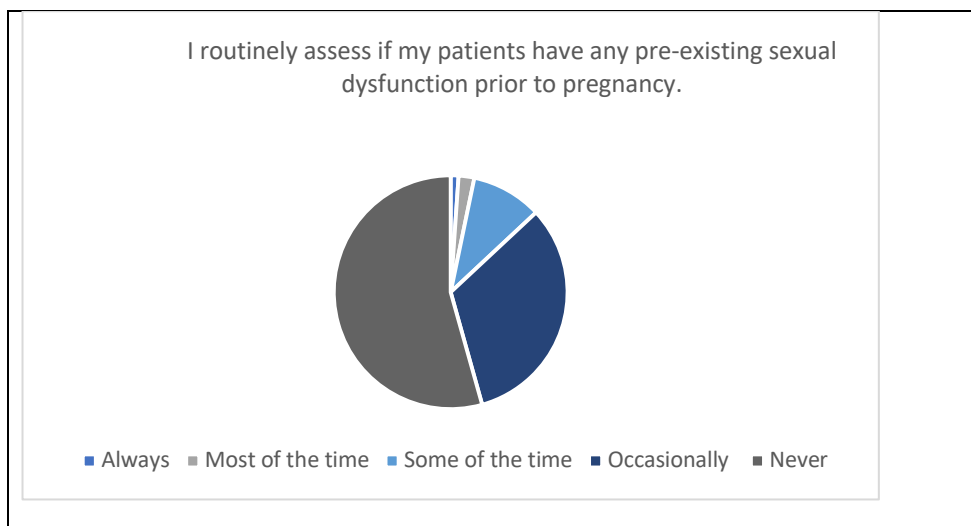
Figure 33. Impact of mode of delivery on sexual function.



7.2.4 Assessment of pre-existing sexual dysfunction.

When asked if pre-existing dysfunction prior to pregnancy was assessed in patients antenatally 53.8% said 'never', 32.6% replied 'occasionally', 9.8% 'some of the time', 2.2% 'most of the time' and 1.1% 'always'.

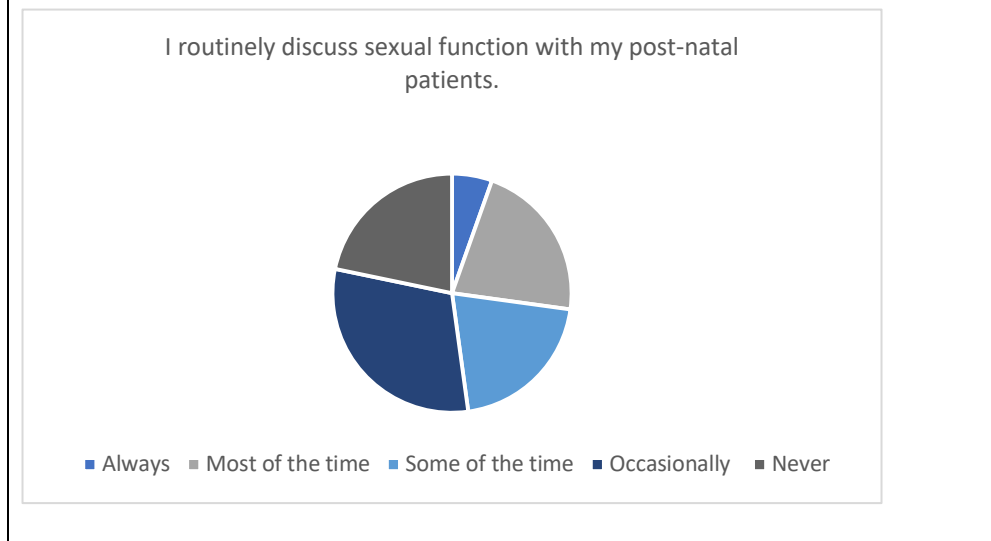
Figure 34. Assessment of pre-existing sexual dysfunction.



7.2.5 Post-natal assessment of sexual function.

Responders felt that sexual function was routinely discussed with post-natal patients 30.4% 'occasionally', 21.7% 'never', 21.7% 'most of the time', 21% 'some of the time' and 5.4% 'always'.

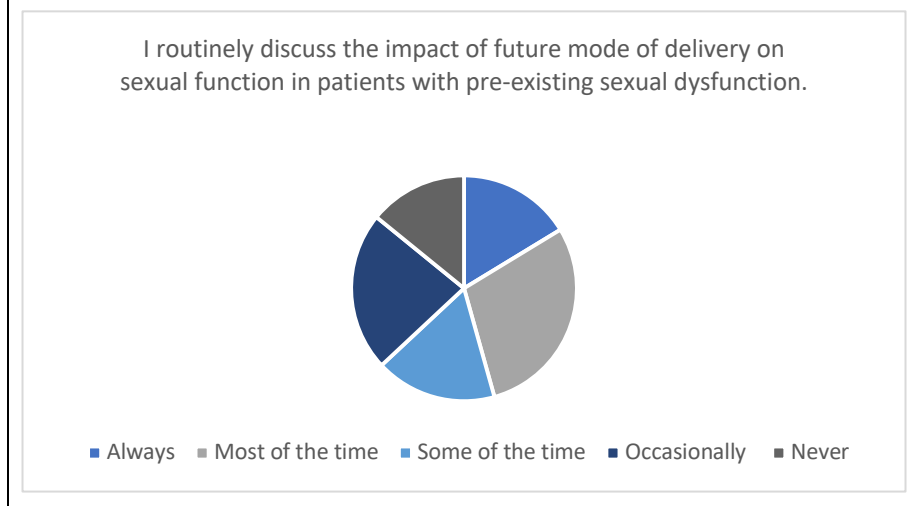
Figure 35. Assessment of post-natal sexual function.



7.2.6 Impact of future mode of delivery.

When asked if they discussed the impact of future mode of delivery on sexual function in patients with pre-existing sexual dysfunction 29.3% said ‘most of the time’, 22.8% ‘occasionally’, 17.4% ‘some of the time’, 16.3% ‘always’ and 14.1% ‘never’.

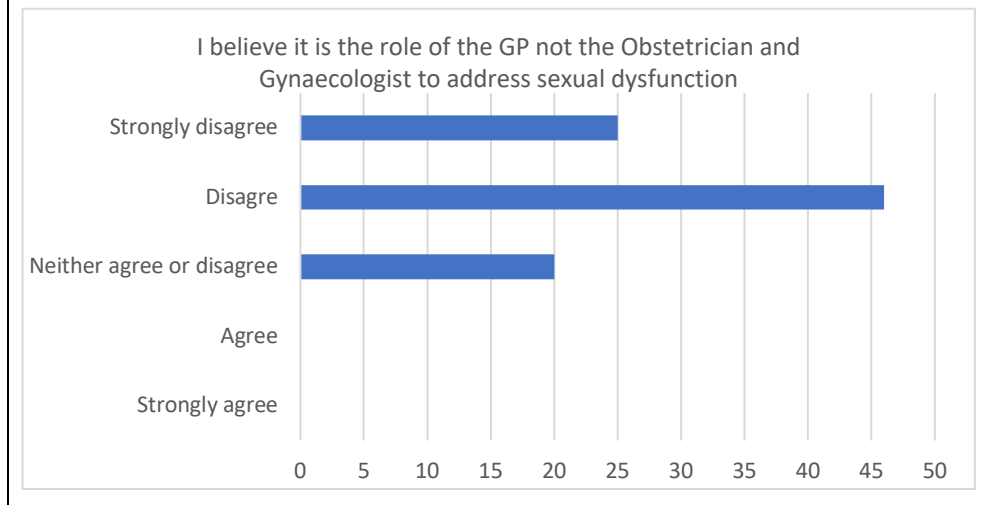
Figure 36. Impact of future mode of delivery on sexual function.



7.2.7 The role of the General Practitioner (GP).

50.5% disagreed that it was role of the GP not the Obstetrician and Gynaecologist to address sexual dysfunction, 27.5% strongly disagreed and 22% neither disagreed nor agreed. None of the responders agreed or strongly agreed.

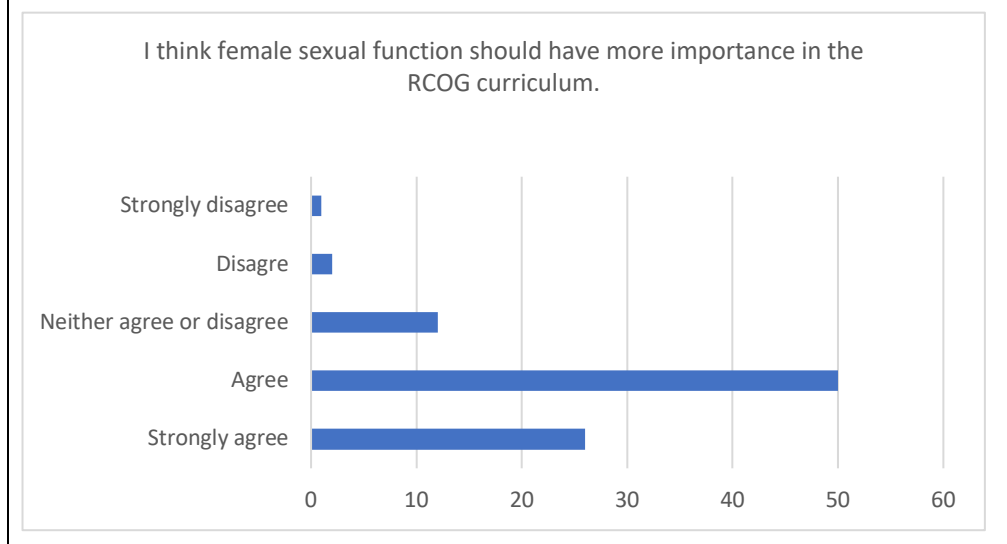
Figure 37. The role of the GP.



7.2.8 RCOG Curriculum.

When asked if female sexual function should have more importance in the RCOG curriculum 54.9% agreed, 28.6% strongly agreed, 13.2% neither agreed nor disagreed, 2.2% disagreed and 1.1% strongly disagreed.

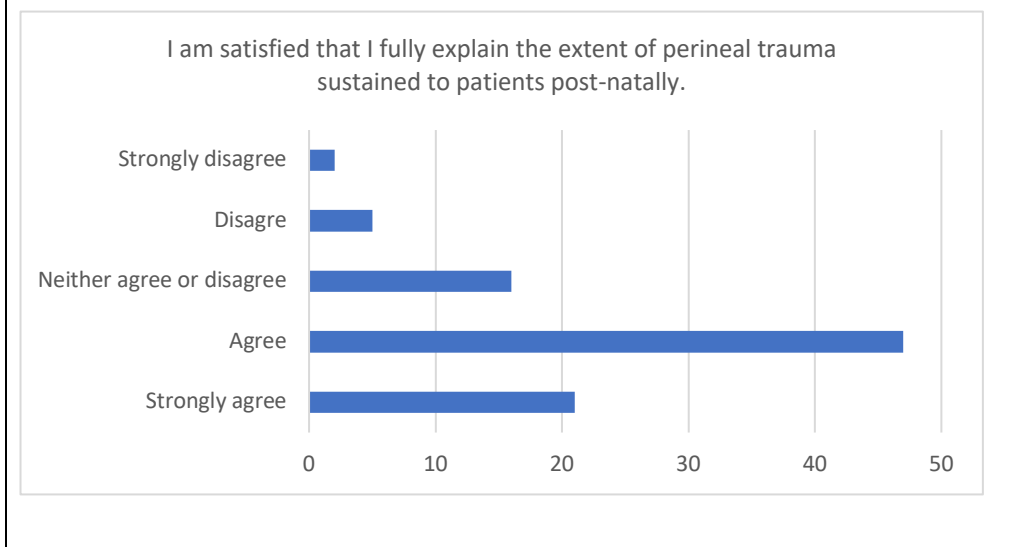
Figure 38. The RCOG Curriculum.



7.2.9 Explanation of trauma to patients.

51.6% of responders agreed that they were satisfied that they explained the extent of perineal trauma sustained to their patients post-natally, 23.1% strongly agreed, 17.6% neither disagreed or agreed, 5.5% disagreed and 2.2% strongly disagreed.

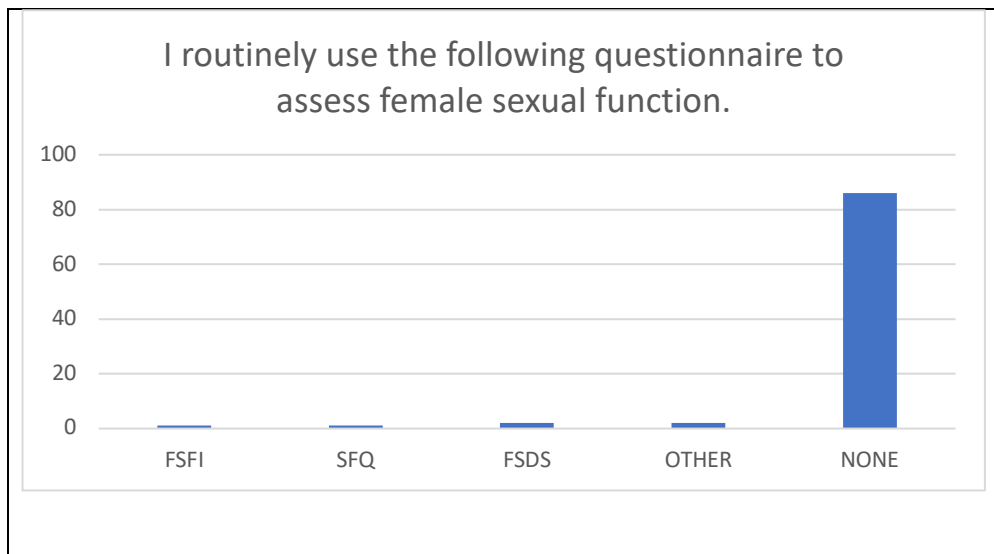
Figure 39. Explanation of perineal trauma to patients.



7.2.10 Use of standardised questionnaires.

93.5% did not routinely use any female sexual function questionnaires, 2.2% used the female sexual distress scale (FSDS), 1.1% the female sexual function index (FSFI), 1.1% the sexual function questionnaire (SFQ) and 2.2% 'other'.

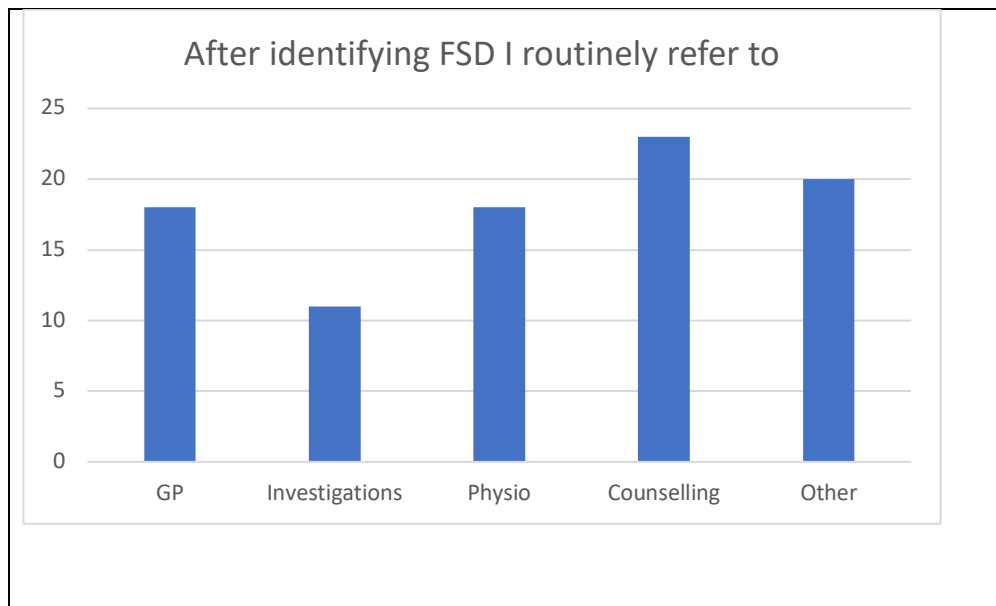
Figure 40. Use of standardised questionnaires.



7.2.11 Referral.

After identifying FSD 25.6% referred patients for counselling, 20% to the GP, 20% for physiotherapy, 12.2% for further investigations and 22.2% 'other'.

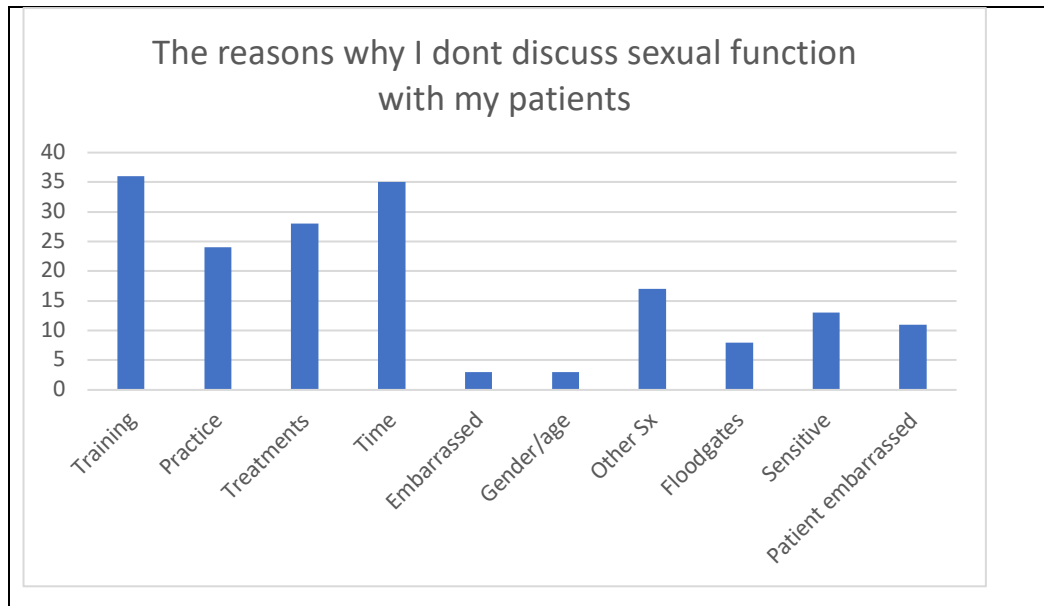
Figure 41. Referral.



7.2.12 Barriers to assessing sexual function.

When asked the reasons why sexual function wasn't discussed with patients, the most commonly cited response was a lack of adequate training, cited 36 times; lack of time 35 times; lack of available treatment options to offer patients 28 times; lack of practice 24 times; patients focused on other symptoms 17 times; it was a sensitive topic 13 times; the patient was embarrassed 11 times; fear of opening the floodgates 8 times; own embarrassment 3 times and due to their own gender or age 3 times.

Figure 42. Barriers to assessing sexual function.



7.3 Discussion.

It is evident from the results given above that sexual function is not being routinely discussed with patients. This is in line with the limited pre-existing literature on the topic where between 9.4%- 33%¹⁴⁰ of obstetricians and gynaecologists were asking routinely about sexual function.

The cohort of doctors sampled in this study is representative of the national workforce of Obstetricians and Gynaecologists in England, with 55% of those registered on the specialist register and 80% of trainees being female according to the RCOG 2018 statistics^{141,142}. In the cohort of respondents 57% were aged 30-40 years, 21% 40- 50 years, 13% under 30 years and 9% over 50 years-old. 41% were working at registrar level, 27% at consultant level, 21% as senior house officers (SHO) and 10% as clinical fellows. The proportion of consultants in this study is lower however than in the national workforce, which is comprised of 2600 consultants, 1800 trainees and 1000 staff and associate specialist doctors.

Antenatally almost 80% of responders were never or only occasionally discussing sexual function. Interestingly the figure was even higher (87%) for never or only occasionally discussing the impact that mode of delivery could have on sexual function. This shows that amongst all levels of obstetric and gynaecological doctors' the topic of female sexual function is very rarely being addressed and even less emphasis is placed on the impact that mode of delivery could have it.

In an increasingly litigious society and with obstetrics being an area of medicine where cases such as the Montgomery trial¹⁴³⁻¹⁴⁵ have highlighted to us the importance of fully informed consent, surely omitting such a potentially important topic is simply not good practice. The Montgomery vs Lanarkshire case of March 2015 involved a diabetic woman suing the hospital trust for negligence after her son developed cerebral palsy following hypoxic injury sustained during the delivery which was complicated by a shoulder dystocia. The claimant's argument centred around the premise that had Montgomery known that there was an increased risk of a sustaining a shoulder dystocia with a vaginal delivery in a diabetic mother, she would have requested a caesarean section from the outset. This landmark case established that, rather than being a matter for clinical judgment to be assessed by professional medical opinion, a patient should be told all information requested by them rather than simply what the doctor believes they need to know. It is perfectly feasible that a similar case could occur, this time with a known large for gestational age baby causing an obstetric anal sphincter injury (OASI) and the patient developing subsequent FSD as a result. If the patient had not be counselled on the risk of developing FSD then they, like Montgomery, could argue that had all the information been fully explained to them, they would have opted for a caesarean section. Whilst FSD is not as serious a complication as cerebral palsy, it is clear that FSD can severely reduce quality of life, psychological well-being and can have detrimental effects on personal relationships and thus also require substantial financial recompense.

Whether the possible of risk of developing FSD would influence maternal decisions regarding mode of delivery is not clear. Some studies have suggested that trying to avoid FSD is not one of the reasons that women opt to have a maternal request caesarean section¹⁴⁶. It is possible that women feel that they cannot say that concerns about sexual functioning influence their decision on mode of delivery due to societal pressure and a judgment over selecting a treatment based on its effect on their own health rather than that of the child. A study in Argentina¹⁴⁷ did find that when a discrete choice experiment was used (a quantitative method for eliciting preferences, allowing relative importance of different characteristics or attributes to be considered simultaneously) women's choice for mode of delivery was influenced by concerns about post-natal sexual function. This was not the case however when open questions were used.

In this study with 86.4% occasionally or never enquiring about pre-existing FSD in their ante-natal patients it is very unlikely that any accurate information regarding the effects of childbirth and pregnancy on sexual function could be being given to patients antenatally. This is similar to the figure of 18% of women having potential changes to sexual function being discussed with them antenatally, that was quoted by Barret et al⁸⁵. Postnatally the situation is slightly better with 74.7% feeling that they were satisfied with the extent to which they explained the degree of perineal trauma sustained. 48.1% said that they routinely discussed sexual function some, most, or all of the time. This may be a reflection of the fact that resumption of sexual activity is a standard question at a routine 6-week post-natal visit. No responders believed it was the role of the GP rather than the specialist to address FSD which is interesting given that so many were not routinely asking about it when consulting patients. One possible explanation is the fact that 83.5% felt that sexual function should have more importance in the RCOG curriculum, and a lack of training was cited by 36 respondents as a reason why they did not routinely enquire about the topic. McCool et al⁶⁷ also reported that a lack of training in residency in Germany was one of the main barriers to adequate discussion of female sexual function by doctors to their patients.

This lack of training is highlighted by the fact that 93.5% of doctors in this study did not routinely use any validated sexual function questionnaire when assessing FSD. The lack of use of an adequate means to assess the problem is also likely to reduce the frequency with which this topic is addressed as it makes analysis of the problem harder and shows a lack of familiarity with the topic. 28 times respondents commented that not feeling as though they had any satisfactory treatments to offer patients if they did identify FSD, was one of the reasons why they did not ask in the first place. Again, a lack of adequate training in the field can contribute to doctors not feeling as though they have viable treatment options to offer patients.

The fact that sexual function in the post-natal phase is not being discussed with patients means that it is very unlikely that women are being adequately prepared for the changes that occur to them both physically and emotionally. Not being prepared for such changes is likely to make adapting to them even more challenging. Olsson et al¹⁴⁸ went as far as to say that this lack of preparation could have a negative effect on both the mother and the father adapting to their new roles as parents.

The World Health Organization states that “all women should be asked about resumption of sexual intercourse and possible dyspareunia, as a part of an assessment of overall well-being two to six weeks after delivery”¹⁴⁸. The concept of performing an assessment between two to six weeks postnatally is perhaps too early on to be adequately assessing post-natal sexual function. Many women will not have resumed sexual activity so early on and this is even more pertinent to those women who suffered more severe perineal trauma at delivery. A lot of the focus of the consultation at six weeks can also revolve more around discussing contraception rather than sexual function and so FSD can often be missed.

7.3.1 Limitations.

The main limitation of this study is the small number of participants. Given that the survey was open for a year-long period getting only 92 responses is fairly

small. Response rate may have been improved by targeting participants at events such as conferences rather than by email only.

Another limitation to this study is the fact that it includes doctors only. This is very important given that much care given to women in the antenatal and postnatal time is by midwives and therefore it would have been helpful to know what their attitudes toward the topic are as well.

7.4 Conclusions.

In conclusion female sexual function is not being routinely asked about in antenatal or postnatal patients and a validated questionnaire is very rarely being used to assess for FSD. Most doctors did feel that they sufficiently explained the extent of perineal trauma sustained to patients, but there was little discussion surrounding the impact that this may have on sexual functioning. Lack of time and a lack of training were frequently cited reasons for a lack of assessment of sexual function and most felt that sexual functioning needed to have more importance in training. Overall it can be seen that this is an important topic that needs to be addressed.

8 Summary.

8.1 Findings.

Overall from this work it can be seen that in primiparous women, pregnancy impacts negatively on female sexual function. Some women see a slight improvement in the second trimester however the overall trend is for worsening sexual functioning with increasing gestation.

Postnatally a significant improvement in female sexual function is seen between three and six months post-partum for all women, regardless of the degree of perineal trauma sustained. FSD rates are lowest and sexual activity rates are highest in the women who had no perineal trauma at both the three and six month time points. The highest rates of FSD at three and six months postnatally were found in the OASI and second degree/ episiotomy groups respectively. More work is however needed to look at the longer term implications of perineal trauma on female sexual functioning.

This work also highlights that fact that female sexual function is not being routinely asked about in antenatal or postnatal patients by doctors. A validated questionnaire is very rarely being used to assess for FSD and most doctors feels they are not being adequately trained in the topic.

The importance of sexual function in overall quality life is well known and so the information gleaned from these studies should be used to provide information to women in the antenatal period about what to expect in terms of sexual function in pregnancy and the postnatal period. Discussing the changes that women are likely to experience is beneficial to women who are experiencing huge psychological, biological and physical changes. By addressing the topic pro-actively in the antenatal, or even pre-conception period, it may allow women and their partners to prepare for and therefore manage better any sexual problems that may occur. Increasing the frequency of discussing the topic of

female sexual functioning during and after pregnancy helps normalise what is evidently a very prevalent problem and helps to prevent women from feeling as though they are suffering alone.

8.2 Limitations.

One of the main limitations of this study is that only one tool (the FSFI) was used to measure female sexual function. A useful addition to the FSFI would have been to have a qualitative element as well, in the form of structured interviews with women. Using the FSFI alone makes it hard to draw reliable conclusions of rates of FSD as for this diagnosis to be made it is important to know the impact that the symptoms are having on a woman's life.

Another major limitation was that the length of the study was also only six months post-natally. To be able to draw conclusions on the long-term impact of perineal trauma on female sexual function these women would need to be followed up over a longer time period.

8.3 Future work.

Following on from this work there are a number of future studies that would be very beneficial to increase our understanding in this field.

As mentioned in the limitations, it would be good to do a further follow-up study of the women over a twelve month, two year and even five year period in order to assess the longer term impact of perineal trauma on sexual functioning. The longer follow up studies would be complicated by women falling pregnant again but then this could lead to another follow up study in to whether those women with symptoms were more likely to opt for a caesarean section in future pregnancies.

The FSFI in English has also not been validated for use in pregnant women or women in the postnatal period. A study looking at its validity in this specific cohort of women would be beneficial in order to be able to draw more robust conclusions.

Further research with a qualitative element, such as interviews with patients or space for free-texting within the questionnaire would also help determine which FSFI scores actually represent FSD given that the DSM-V requires the symptoms to be causing personal distress to the woman for FSD to be diagnosed.

It would also be of interest to have future research into the OASI group with higher numbers of the more extensive tears (3c and 4th degree) in order to be able to assess further how the extent of trauma impacts on post-partum sexual functioning.

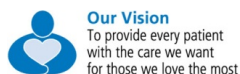
A similar study to the one performed on doctors could also be extended to other healthcare professionals involved in the care of pregnant women such as GPs and midwives in order to gain a more holistic view of the current information being given to women.

There is also clearly a gap in the curriculum for obstetricians and gynaecologists with regards to female sexual function. Future work could involve improving this by assessing what would be beneficial to teach doctors in training and thus creating a new training module to cover this. Given that very few doctors were using any standardised questionnaires to assess female sexual function a new, simplified questionnaire could be created for doctors to use in their practice to better assess FSD.

All of these would help in improving our understanding even further of female sexual functioning during and after pregnancy and thus improve the counselling and care that we can provide women.

9 Appendices.

9.1 Participant information leaflet.



Norfolk and Norwich University Hospitals 
NHS Foundation Trust

DEPARTMENT OF OBSTETRICS & GYNAECOLOGY

Colney Lane, Norwich, United Kingdom, NR4 7UY

Participant Information Sheet

Study Title: A study of female sexual function during and after pregnancy.

Chief Investigator: Dr C Cassis, Norwich, UK

WHAT IS THE PURPOSE OF THE STUDY?

Female sexual function during and after pregnancy remains a relatively under-investigated subject, despite being relevant to a large proportion of society. The aim of this study is to better understand the factors influencing female sexual function during and after pregnancy, especially the impact that varying degrees of perineal (the area between the vagina and the anus) tear has. This information will hopefully allow us to gain a better understanding of sexual function during pregnancy and after childbirth and therefore be better able to advise and treat other women like yourself.

WHY HAVE I BEEN INVITED?

You may be currently pregnant; or you may have recently had a caesarean section or a vaginal delivery.

DO I HAVE TO TAKE PART?

No. Participation in the study is voluntary. If you do not wish to be involved this will not affect your care in anyway.

WHAT WILL HAPPEN TO ME IF I TAKE PART?

After having read through the information leaflet you will have the opportunity to ask any questions you may have. If you consent to taking part in the study you will be asked to complete a questionnaire containing 19 questions about sexual function. You may complete this questionnaire online or on paper. If you are currently pregnant, we will ask you to complete a new questionnaire each trimester. If you have already had your baby we will ask you to answer it at 3 and 6 months post nately.

WHAT ARE THE POSSIBLE DISADVANTAGES OF TAKING PART?

You care will not be disadvantaged in any way. It will simply take up around 10 mins of your time to answer each of the questionnaires. It is possible that you may find some of the questions distressing to answer.

WHAT WILL HAPPEN IF I DON'T WANT TO CARRY ON IN THE STUDY?

You may withdraw your consent at any time and without giving a reason. Your subsequent care will not be affected. Any data already collected will be stored confidentially and used in study results. You will not be asked to complete any further questionnaires.

WILL MY TAKING PART IN THIS STUDY BE KEPT CONFIDENTIAL?

Yes. To maintain confidentiality all questionnaires will be marked with a unique participant number for collection of data. Your personal data will only be identifiable by codes held in a secure database at the Norfolk and Norwich University Hospital in Norwich, UK. You will not be identified personally in any published data. If you wish to be sent the results of the study, we will do so, to your home address, with your consent.

WILL MY GENERAL PRACTITIONER BE INFORMED OF MY INVOLVEMENT?

With your consent your general practitioner will be notified regarding your participation in the study. Information will only be shared with your GP if it has an impact on your medical care and you consent to that.

WHAT WILL HAPPEN TO THE RESULTS OF THIS CLINICAL TRIAL?

The results will be reviewed and will be presented for publication in scientific journals and for presentation at medical conferences.

CONTACT FOR FURTHER INFORMATION?

Thank you for taking the time to read this information sheet. Should you have any concerns about the study or need to up-date your contact information, please contact:

Dr Charlotte Cassis, Clinical Research Fellow
Norfolk and Norwich University Hospital
Norfolk and Norwich University Hospitals NHS Foundation Trust
Colney Lane
Norwich NR4 7UY
charlotte.cassis@nnuh.nhs.uk
Phone: 01603 287100

The PALS Manager
Norfolk and Norwich University Hospital
West Outpatients Level 2,
Colney Lane,
Norwich NR4 7UY
pals@nnuh.nhs.uk
Phone: 01603 289036 or 01603 289045

9.2 Participant Consent Form.

Patient Identification Number for this study:

Title of Project: A study on female sexual function during and after pregnancy.

Name of Researcher:

Please initial to confirm

I confirm that I have read and understand the information sheet for the above study.	<input type="checkbox"/>
I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	<input type="checkbox"/>
I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.	<input type="checkbox"/>
I understand that relevant sections of any of my medical notes and data collected during the study, may be looked at by responsible individuals from regulatory authorities or from the NHS Trust, where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records.	<input type="checkbox"/>
I understand I will be asked to complete the Female Sexual Function Index questionnaire up to a maximum of 3 times through-out the study (depending on which group I am in).	<input type="checkbox"/>
I agree to take part in the above research study.	<input type="checkbox"/>
I would like to receive an information sheet of the findings of the study, which will be sent to my home address.	<input type="checkbox"/>

Name of Patient

Date

Signature

Name of Person taking consent

Date

Signature

(if different from researcher)

9.3 Female Sexual Function Index (FSFI) □

Subject Identifier _____ Date _____

INSTRUCTIONS: These questions ask about your sexual feelings and responses during the past 4 weeks. Please answer the following questions as honestly and clearly as possible. Your responses will be kept completely confidential. In answering these questions the following definitions apply:

Sexual activity can include caressing, foreplay, masturbation and vaginal intercourse.

Sexual intercourse is defined as penile penetration (entry) of the vagina.

Sexual stimulation includes situations like foreplay with a partner, self-stimulation (masturbation), or sexual fantasy.

CHECK ONLY ONE BOX PER QUESTION.

Sexual desire or interest is a feeling that includes wanting to have a sexual experience, feeling receptive to a partner's sexual initiation, and thinking or fantasizing about having sex.

1. Over the past 4 weeks, how **often** did you feel sexual desire or interest?

- Almost always or always
- Most times (more than half the time)
- Sometimes (about half the time)
- A few times (less than half the time)
- Almost never or never

2. Over the past 4 weeks, how would you rate your **level** (degree) of sexual desire or interest?

- Very high
- High
- Moderate
- Low
- Very low or none at all

Sexual arousal is a feeling that includes both physical and mental aspects of sexual excitement. It may include feelings of warmth or tingling in the genitals, lubrication (wetness), or muscle contractions.

3. Over the past 4 weeks, how **often** did you feel sexually aroused ("turned on") during sexual activity or intercourse?

- No sexual activity
- Almost always or always

Most times (more than half the time)
Sometimes (about half the time)
A few times (less than half the time)
Almost never or never

4. Over the past 4 weeks, how would you rate your **level** of sexual arousal ("turn on") during sexual activity or intercourse?

No sexual activity
Very high
High
Moderate
Low
Very low or none at all

5. Over the past 4 weeks, how **confident** were you about becoming sexually aroused during sexual activity or intercourse?

No sexual activity
Very high confidence
High confidence
Moderate confidence
Low confidence
Very low or no confidence

6. Over the past 4 weeks, how **often** have you been satisfied with your arousal (excitement) during sexual activity or intercourse?

No sexual activity
Almost always or always
Most times (more than half the time)
Sometimes (about half the time)
A few times (less than half the time)
Almost never or never

7. Over the past 4 weeks, how **often** did you become lubricated ("wet") during sexual activity or intercourse?

No sexual activity
Almost always or always
Most times (more than half the time)
Sometimes (about half the time)
A few times (less than half the time)
Almost never or never

8. Over the past 4 weeks, how **difficult** was it to become lubricated ("wet") during sexual activity or intercourse?

No sexual activity
Extremely difficult or impossible

Very difficult
Difficult
Slightly difficult
Not difficult

9. Over the past 4 weeks, how often did you **maintain** your lubrication ("wetness") until completion of sexual activity or intercourse?

No sexual activity
Almost always or always
Most times (more than half the time)
Sometimes (about half the time)
A few times (less than half the time)
Almost never or never

10. Over the past 4 weeks, how **difficult** was it to maintain your lubrication ("wetness") until completion of sexual activity or intercourse?

No sexual activity
Extremely difficult or impossible
Very difficult
Difficult
Slightly difficult
Not difficult

11. Over the past 4 weeks, when you had sexual stimulation or intercourse, how **often** did you reach orgasm (climax)?

No sexual activity
Almost always or always
Most times (more than half the time)
Sometimes (about half the time)
A few times (less than half the time)
Almost never or never

12. Over the past 4 weeks, when you had sexual stimulation or intercourse, how **difficult** was it for you to reach orgasm (climax)?

No sexual activity
Extremely difficult or impossible
Very difficult
Difficult
Slightly difficult
Not difficult

13. Over the past 4 weeks, how **satisfied** were you with your ability to reach orgasm (climax) during sexual activity or intercourse?

No sexual activity
Very satisfied

Moderately satisfied
About equally satisfied and dissatisfied
Moderately dissatisfied
Very dissatisfied

14. Over the past 4 weeks, how **satisfied** have you been with the amount of emotional closeness during sexual activity between you and your partner?

No sexual activity
Very satisfied
Moderately satisfied
About equally satisfied and dissatisfied
Moderately dissatisfied
Very dissatisfied

15. Over the past 4 weeks, how **satisfied** have you been with your sexual relationship with your partner?

Very satisfied
Moderately satisfied
About equally satisfied and dissatisfied
Moderately dissatisfied
Very dissatisfied

16. Over the past 4 weeks, how **satisfied** have you been with your overall sexual life?

Very satisfied
Moderately satisfied
About equally satisfied and dissatisfied
Moderately dissatisfied
Very dissatisfied

17. Over the past 4 weeks, how **often** did you experience discomfort or pain during vaginal penetration?

Did not attempt intercourse
Almost always or always
Most times (more than half the time)
Sometimes (about half the time)
A few times (less than half the time)
Almost never or never

18. Over the past 4 weeks, how **often** did you experience discomfort or pain following vaginal penetration?

Did not attempt intercourse
Almost always or always
Most times (more than half the time)
Sometimes (about half the time)
A few times (less than half the time)

Almost never or never

19. Over the past 4 weeks, how would you rate your **level** (degree) of discomfort or pain during or following vaginal penetration?

Did not attempt intercourse

Very high

High

Moderate

Low

Very low or none at all

Thank you for completing this questionnaire.

9.4 FSFI Scoring Appendix.

Question	Response Options
1. Over the past 4 weeks, how often did you feel sexual desire or interest?	5 = Almost always or always 4 = Most times (more than half the time) 3 = Sometimes (about half the time) 2 = A few times (less than half the time) 1 = Almost never or never
2. Over the past 4 weeks, how would you rate your level (degree) of sexual desire or interest?	5 = Very high 4 = High 3 = Moderate 2 = Low 1 = Very low or none at all
3. Over the past 4 weeks, how often did you feel sexually aroused ("turned on") during sexual activity or intercourse?	0 = No sexual activity 5 = Almost always or always 4 = Most times (more than half the time) 3 = Sometimes (about half the time) 2 = A few times (less than half the time) 1 = Almost never or never
4. Over the past 4 weeks, how would you rate your level of sexual arousal ("turn on") during sexual activity or intercourse?	0 = No sexual activity 5 = Very high 4 = High 3 = Moderate 2 = Low 1 = Very low or none at all
5. Over the past 4 weeks, how confident were you about becoming sexually aroused during sexual activity or intercourse?	0 = No sexual activity 5 = Very high confidence 4 = High confidence 3 = Moderate confidence 2 = Low confidence 1 = Very low or no confidence
6. Over the past 4 weeks, how often have you been satisfied with your arousal (excitement) during sexual activity or intercourse?	0 = No sexual activity 5 = Almost always or always 4 = Most times (more than half the time) 3 = Sometimes (about half the time) 2 = A few times (less than half the time) 1 = Almost never or never

7. Over the past 4 weeks, how often did you become lubricated ("wet") during sexual activity or intercourse?
- 0 = No sexual activity
5 = Almost always or always
4 = Most times (more than half the time)
3 = Sometimes (about half the time)
2 = A few times (less than half the time)
1 = Almost never or never
8. Over the past 4 weeks, how difficult was it to become lubricated ("wet") during sexual activity or intercourse?
- 0 = No sexual activity
1 = Extremely difficult or impossible
2 = Very difficult
3 = Difficult
4 = Slightly difficult
5 = Not difficult
9. Over the past 4 weeks, how often did you maintain your lubrication ("wetness") until completion of sexual activity or intercourse?
- 0 = No sexual activity
5 = Almost always or always
4 = Most times (more than half the time)
3 = Sometimes (about half the time)
2 = A few times (less than half the time)
1 = Almost never or never
10. Over the past 4 weeks, how difficult was it to maintain your lubrication ("wetness") until completion of sexual activity or intercourse?
- 0 = No sexual activity
1 = Extremely difficult or impossible
2 = Very difficult
3 = Difficult
4 = Slightly difficult
5 = Not difficult
11. Over the past 4 weeks, when you had sexual stimulation or intercourse, how often did you reach orgasm (climax)?
- 0 = No sexual activity
5 = Almost always or always
4 = Most times (more than half the time)
3 = Sometimes (about half the time)
2 = A few times (less than half the time)
1 = Almost never or never
12. Over the past 4 weeks, when you had sexual stimulation or intercourse, how difficult was it for you to reach orgasm (climax)?
- 0 = No sexual activity
1 = Extremely difficult or impossible
2 = Very difficult
3 = Difficult
4 = Slightly difficult
5 = Not difficult

13. Over the past 4 weeks, how satisfied were you with your ability to reach orgasm (climax) during sexual activity or intercourse?
- 0 = No sexual activity
5 = Very satisfied
4 = Moderately satisfied
3 = About equally satisfied and dissatisfied
2 = Moderately dissatisfied
1 = Very dissatisfied
14. Over the past 4 weeks, how satisfied have you been with the amount of emotional closeness during sexual activity between you and your partner?
- 0 = No sexual activity
5 = Very satisfied
4 = Moderately satisfied
3 = About equally satisfied and dissatisfied
2 = Moderately dissatisfied
1 = Very dissatisfied
15. Over the past 4 weeks, how satisfied have you been with your sexual relationship with your partner?
- 5 = Very satisfied
4 = Moderately satisfied
3 = About equally satisfied and dissatisfied
2 = Moderately dissatisfied
1 = Very dissatisfied
16. Over the past 4 weeks, how satisfied have you been with your overall sexual life?
- 5 = Very satisfied
4 = Moderately satisfied
3 = About equally satisfied and dissatisfied
2 = Moderately dissatisfied
1 = Very dissatisfied
17. Over the past 4 weeks, how often did you experience discomfort or pain during vaginal penetration?
- 0 = Did not attempt intercourse
1 = Almost always or always
2 = Most times (more than half the time)
3 = Sometimes (about half the time)
4 = A few times (less than half the time)
5 = Almost never or never
18. Over the past 4 weeks, how often did you experience discomfort or pain following vaginal penetration?
- 0 = Did not attempt intercourse
1 = Almost always or always
2 = Most times (more than half the time)
3 = Sometimes (about half the time)
4 = A few times (less than half the time)
5 = Almost never or never

19. Over the past 4 weeks, how would you rate your level (degree) of discomfort or pain during or following vaginal penetration?

0 = Did not attempt intercourse

1 = Very high

2 = High

3 = Moderate

4 = Low

5 = Very low or none at all

9.4.1 FSFI DOMAIN SCORES AND FULL SCALE SCORE

The individual domain scores and full scale (overall) score of the FSFI can be derived from the computational formula outlined in the table below. For individual domain scores, add the scores of the individual items that comprise the domain and multiply the sum by the domain factor (see below). Add the six domain scores to obtain the full scale score. It should be noted that within the individual domains, a domain score of zero indicates that the subject reported having no sexual activity during the past month. Subject scores can be entered in the right-hand column.

Domain	Questions	Score Range	Factor	Minimum score	Maximum Score	Score
Desire	1,2	1-5	0.6	1.2	6.0	
Arousal	3,4,5,6	0-5	0.3	0	6.0	
Lubrication	7,8,9,10	0-5	0.3	0	6.0	
Orgasm	11,12,13	0-5	0.4	0	6.0	
Satisfaction	14,15,16	0 (or 1)-5	0.4	0.8	6.0	
Pain	17,18,19	0-5	0.4	0	6.0	

9.5 Doctors Survey.

The approach of obstetricians and gynaecologists to female sexual function.

- 1 I discuss sexual function with my antenatal patients?
 - a. Always
 - b. Most of the time
 - c. Some of the time
 - d. Occasionally
 - e. Never

- 2 I routinely discuss the impact that mode of delivery can have on female sexual function with my antenatal patients
 - a. Always
 - b. Most of the time
 - c. Some of the time
 - d. Occasionally
 - e. Never

- 3 I routinely assess if my antenatal patients have any pre-existing sexual dysfunction prior to this pregnancy
 - a. Always
 - b. Most of the time
 - c. Some of the time
 - d. Occasionally
 - e. Never

- 4 I discuss sexual function with all my postnatal patients?
 - a. Always
 - b. Most of the time
 - c. Some of the time
 - d. Occasionally
 - e. Never

- 5 I routinely discuss future mode of delivery with all my postnatal patients who have problems with sexual function?
- Always
 - Most of the time
 - Some of the time
 - Occasionally
 - Never
- 6 I routinely use one of the following questionnaires to discuss sexual function with my patients.
- Female sexual function index (FSFI)
 - The brief index of Sexual Function Questionnaire (SFQ) for women,
 - Female Sexual Distress Scale (FSDS)
 - Changes in Sexual Functioning Questionnaire (CSFQ).
 - Other
 - None
- 7 After identifying sexual function problems in my patients I:
- Refer back to GP
 - Refer for further investigations
 - Refer for physiotherapy
 - Refer to psychiatry
 - Refer for psychosexual counselling
 - Other
- 8 I believe it is the role of the GP not the obstetrician and gynaecologist to discuss sexual function with patients
- Strongly agree
 - Agree
 - Neither agree nor disagree
 - Disagree
 - Strongly disagree

- 9 I think female sexual function should have more importance in the RCOG curriculum
- a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree
- 10 I am satisfied that I fully explain the extent of perineal trauma sustained to my post-natal patients.
- a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree
- 11 I don't discuss sexual function with patients because (please tick all that apply):
- a. I don't feel as though I have had adequate training
 - b. I don't feel I have had adequate practice
 - c. I worry about "opening the floodgates"
 - d. I find patients talk about other symptoms
 - e. I don't have time
 - f. I don't have any effective treatments to offer
 - g. I feel embarrassed asking
 - h. The patients are embarrassed to talk about it
 - i. It's a sensitive subject
 - j. I feel that I can't because of my gender/age

12. Please tell us where you are in your career.

- a. SHO
- b. Registrar
- c. Clinical Fellow
- d. Post CCT
- e. Consultant
- f. Other (please specify)

13. Please tell us your gender.

- a. Female
- b. Male
- c. Other
- d. Rather not say

Many thanks for your help.

9.6 Ethical approval.



Health Research Authority

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23 January 2017

Dear Dr Cassis

Letter of HRA Approval

Study title:	A study on female sexual function in the three trimesters of pregnancy and following varying degrees on perineal trauma in the first 6 months postnatally.
IRAS project ID:	217595
REC reference:	16/EM/0522
Sponsor	NNUH Department of research and development

I am pleased to confirm that **HRA Approval** has been given for the above referenced study, on the basis described in the application form, protocol, supporting documentation and any clarifications noted in this letter.

Participation of NHS Organisations in England

The sponsor should now provide a copy of this letter to all participating NHS organisations in England.

10 Abbreviations.

<i>B</i>	
BMI	Body Mass Index
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<i>D</i>	
DSFI	The Derogitas Sexual Functioning Inventory
DSM	Diagnostic and Statistical Manual of Mental Disorders
<hr/>	
<i>E</i>	
EAS	External Anal Sphincter
<hr/>	
<i>F</i>	
FI	Faecal Incontinence
FSD	Female sexual dysfunction
FSDS	Female Sexual Distress Scale
FSFI	Female Sexual Function Index
<hr/>	
<i>G</i>	
GDPR	General Data Protection Regulation
GP	General Practitioner
<hr/>	
<i>I</i>	
IIQ-7	Incontinence Impact Questionnaire
IRAS	Integrated Research Application System
IRS	Intimate Relationship Scale
ISI	Incontinence Severity Index
IVF	In-vitro Fertilisation
<hr/>	
<i>M</i>	
MMQ	Maudsley Marital Questionnaire
<hr/>	
<i>N</i>	
NNUH	Norfolk and Norwich University Hospital
<hr/>	
<i>O</i>	
OASI	Obstetric Anal Sphincter Injury
OVD	Operative Vaginal Delivery
<hr/>	
<i>P</i>	
PFIQ-7	The Pelvic Floor Impact Questionnaire
POP-Q	Pelvic Organ Prolapse Quantification
PROM	Patient Report Outcome Measures

<i>R</i>	
REC	Research Ethics Committee
RCOG	Royal College of Obstetrics and Gynaecology

<i>S</i>	
SAS	Statistical Analysis Software
SFQ	The Sexual Function Questionnaire

<i>T</i>	
T1	First Trimester
T2	Second Trimester
T3	Third Trimester

<i>U</i>	
UI	Urinary incontinence

<i>V</i>	
VPA	Vaginal Pulse Amplitude

<i>W</i>	
WFIS	Wexner Faecal Incontinence Scale

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