The Affect of Language on Attitudes Towards Levonorgestrel-based Emergency Contraception

Myths and Misconceptions

Emma Jane Armstrong Harcourt

A thesis submitted in partial fulfilment of the requirements for the Degree of Master of Science Communication

Centre for Science Communication, University of Otago, Dunedin, New Zealand

March 2017
Abstract

Globally, there is at least one registered form of emergency or post-coital contraception registered in 146 countries, with a further 22 countries importing emergency contraceptive products. By far the most commonly accessed emergency contraceptive, levonorgestrel-based emergency contraception (LNG-EC) features in the essential medicines list (EML) of 62 countries, out of a total of 118 countries with publicly available EMLs. LNG-EC is a safe and effective way of preventing an unintended pregnancy after unprotected sexual intercourse has occurred.

The current consensus is that LNG-EC works primarily through the suppression of ovulation and thus prevents the fusion of sperm and ovum (fertilisation). It is unlikely that LNG-EC acts after fertilisation and it cannot harm an established pregnancy. However, the information presented to the public frequently implies that LNG-EC can impair the implantation process, wherein a blastocyst attaches to the wall of the uterus. This post-fertilisation action is morally unacceptable to many.

My work concerns how the language used to describe how LNG-EC prevents a pregnancy effects attitudes towards the medication. There are prevalent misconceptions of how the medication acts and the effect that access to LNG-EC has on sexual behaviour, such as that it may harm an early embryo or that access to the medication encourages riskier sexual practices. I conducted a small pilot study and an experiment to examine how the language used to describe the
mechanism through which LNG-EC acts to prevent pregnancy influences attitudes towards the medications.

I found that, although the priming text did not influence attitudes towards LNG-EC, frequency of religious service attendance was very strongly correlated with both attitudes towards the medication and with support for access to the medication. Specifically, that more frequent religious service attendance was positively correlated with negative attitudes towards LNG-EC and negatively correlated with support for access to LNG-EC.

The second half of this manuscript fulfils the creative component requirement for the Master’s of Science Communication degree and takes the form of a creative non-fiction novella. While the academic thesis is intended as a serious scientific argument and contribution to the literature surrounding emergency contraception, the creative half of the manuscript is intended as a humorous work to be read for enjoyment as well as enlightenment.

Although the creative component was undoubtedly more fun to research and write, it required just as much hard work and diligence as the academic component did. And, although the tone is light-hearted and funny, purpose of the creative component was the same as that of the academic thesis: to dispel myths and shed light upon murky areas of knowledge.
Acknowledgements

I want to thank my supervisor, Jesse Bering, and my colleagues in the Centre for Science Communication, Sue Harvey, Steve Ting, Emma Curtin, and Jean Fletcher, for being incredibly generous with their time and energy. All of these individuals provided me with invaluable support and encouragement while I conducted my experiment and prepared my thesis.

I also wish to thank my classmates, housemates, family, and the Family Planning Association for the essential roles they have played over the last 15 months. In particular, I want to thank Guy Frederick, Vibhuti Patel, Emma Schranz, Elise Provis, Sam Fraser-Baxter, and Siana Fitzjohn for being tolerant while I watched bull electro-ejaculation videos in our shared office and constantly distracted them with lurid stories of sex-related mayhem like lethal nipple clamp hijinks.
# Table of Contents

Abstract ................................................................................................................................. i
Acknowledgements ............................................................................................................... iii
List of Tables and Figures ..................................................................................................... vi
Introduction ......................................................................................................................... 1

## Literature Review
- Mechanisms of action ........................................................................................................ 3
- Action on Sperm Transport and Function ........................................................................... 7
- Action on Follicular Development and Ovulation ............................................................... 8
- Action on the Endometrium and Endometrial Receptivity to Implantation ..................... 12
- Conclusion ......................................................................................................................... 16

## Barriers to Access and Use of LNG-EC ........................................................................ 17
- Lack of Risk Awareness ...................................................................................................... 18
- Lack Of Emergency Contraceptive Knowledge ................................................................. 21
- Global Perspective ............................................................................................................ 22
- Knowledge of LNG-EC in Africa ....................................................................................... 23
- Knowledge of LNG-EC in Asia ......................................................................................... 24
- Knowledge of LNG-EC in Americas ............................................................................... 26
- Knowledge of LNG-EC in Europe ..................................................................................... 29
- Role of Education in EC Knowledge ................................................................................ 31
- Role of the media in EC Knowledge ................................................................................ 31
- Confusion between EC and Abortion ................................................................................. 33
- Institutional Barriers to LNG-EC Use ............................................................................... 34
- Company Policy Restricting LNG-EC Access .................................................................. 36
- Medical refusal to dispense or prescribe ......................................................................... 39

## The Experiment ............................................................................................................... 45
- Introduction ....................................................................................................................... 45
- Aims ................................................................................................................................... 45
- Methods ............................................................................................................................. 46
- Priming Texts ..................................................................................................................... 47
- The Survey Tool ............................................................................................................... 48
- Recruitment Method ......................................................................................................... 54
- Selection Criteria .............................................................................................................. 54
- Limitations of the Recruitment Method and Criteria .................................................... 55

## Results and Discussion .................................................................................................. 56
- Data Collection Period ...................................................................................................... 56
- Data Analysis ...................................................................................................................... 56
- Participants ......................................................................................................................... 58
- Text group assignment ...................................................................................................... 61
- Role of religion on attitudes towards LNG-EC ................................................................. 63
- Discussion .......................................................................................................................... 69
- Limitations ........................................................................................................................ 80

## Conclusion ....................................................................................................................... 83

## Appendix 1: The Survey ................................................................................................. 94

## Myths and Misconceptions ............................................................................................. 1
Kia Ora.................................................................................................................................................4

The Nuts and Bolts .........................................................................................................................7
  Money-shot Misinformation ........................................................................................................... 7
  Problemas de Pene ....................................................................................................................... 16

Not Your Mother’s Vagina Monologues .................................................................................... 20
  How is Babby Formed? ................................................................................................................. 21
  Menstruation Mania .................................................................................................................... 30

Let’s Get Physical ........................................................................................................................ 41
  Sexual Shenanigans .................................................................................................................... 41
  Erotic Orifice Injuries; or Things You Should Think Twice about Sticking in Your Anatomy .......................................................................................................................... 50
  Potions and Sexy Sorcery ............................................................................................................. 64

Sexual Healing ............................................................................................................................. 74
  To Conceive or Not Conceive ...................................................................................................... 75
  Hey Doc, Can You Look At My Rash? ...................................................................................... 79

And so to bed................................................................................................................................... 82
List of Tables and Figures

Table 1: Demographic characteristics of the study population. 60

Figure 1: Personal intention to use LNG-EC vs. frequency of religious service attendance (%). 64

Figure 2: Support for friends’ use of LNG-EC vs. frequency of religious service attendance (%). 64

Figure 3: Support for minors’ access to LNG-EC vs. frequency of religious service attendance (%). 65

Figure 4: Support for universal access to LNG-EC vs. frequency of religious service attendance (%). 65

Figure 5: Agreement with stereotype that LNG-EC users are careless with their birth control vs. frequency of religious service attendance (%). 66

Figure 6: Agreement with the stereotype that access to LNG-EC encourages promiscuity vs. frequency of religious service attendance (%). 67

Figure 7: Agreement with the stereotype that LNG-EC users are more likely to contract an STI vs. frequency of religious service attendance (%). 67

Figure 8: Agreement with the stereotype that access to LNG-EC decreases use of more reliable methods of contraception (%). 68
Introduction

Currently, it is estimated that approximately 40% of all pregnancies worldwide are unintended (Sedgh, Finer, Bankole, Eilers, & Singh, 2015); in the United States of America, that number is closer to 50% (Finer & Zolna, 2014, 2016). This isn't to say that these pregnancies are necessarily unwanted, just unplanned. This occurs in spite of the great strides made in sexual health education and the prevalence of sexual health clinics. Some of these unintended pregnancies (UP) end in abortion while others result in a hasty restructuring of finances and living arrangements. Either way, it has been shown that it is preferable, wherever possible, to plan pregnancies.

Not only does planning allow potential parents to ensure their finances and lifestyles are able to accommodate another child, but also there are well-documented health benefits associated with intended pregnancies. Intended pregnancies are recognized earlier (Ayoola, 2015; Kost & Lindberg, 2015; Lindberg, Maddow-Zimet, Kost, & Lincoln, 2015), and receive prenatal care earlier and more consistently (Cheng, Schwarz, Douglas, & Horon, 2009; Kost & Lindberg, 2015; Lindberg et al., 2015). Unintended pregnancies are associated with lower birth weights (Kost & Lindberg, 2015; Shah et al., 2011), greater risk for premature birth (Shah et al., 2011), a larger incidence of smoking and drinking during pregnancy (Cheng et al., 2009; Lindberg et al., 2015), a greater risk for peri- and ante-natal depression (Fellenzer & Cibula, 2014; Norhayati, Hazlina, Asrenee, & Emilin, 2015), and are less likely to be breast-fed for the
recommended 6 months as well as less likely to be breast-fed at all (Cheng et al., 2009; Lindberg et al., 2015).

Levonorgestrel-based emergency contraception (LNG-EC) is the ‘gold standard’ of post-coital contraception; it is a widely available, inexpensive, and effective method of preventing an unintended pregnancy if the first line of contraception fails or in the case of sexual assault (International Consortium for Emergency Contraception, 2016). However, the medication has vocal opponents who object to its use and its availability to the public.

Our research examines how the language used to describe the way LNG-EC works to prevent a pregnancy contributes to the negative attitudes held by opponents to the medication. Currently, product information for LNG-EC makes reference to implantation, meaning the implantation of a blastocyst or early embryo\(^1\) in the uterine lining. Opponents of the medication belief that any drug that can prevent a blastocyst or embryo from implanting is an abortifacient.

\( ^1 \) The proper terminology for this stage of embryogenesis is contentious, with the word “embryo” frequently being used by both academic and lay-publications. Alternative words used for this stage of development include “fertilized egg”, “blastocyst”, and “proto-embryo.” For simplicity, the term “embryo” will be used throughout the text, except when directly quoting another text.
Literature Review

Mechanisms of action.

Although certain social factions disapprove of contraception of any kind, the special outrage that levonorgestrel-based emergency contraception (LNG-EC) attracts is presumably due to the misperception that it is an abortifacient (i.e., a drug that ends an already established pregnancy). Further complicating this issue is a common misunderstanding (or disagreement) about when a pregnancy begins: either at the moment of fertilization; or, as is generally accepted by institutions like the American College of Obstetricians and Gynaecologists (ACOG), at the moment that an embryo successfully implants in the lining of the uterus (Gold, 2005).

The ACOG adopted this definition of pregnancy in 1965, but the earliest recorded use of this definition is found in Obstetrics: The Science and the Art, written in 1852 by C.D. Meigs, professor of midwifery at Jefferson Medical College:

“Conception is the fixation of a fecundated ovum upon the living surface of the mother; it is the formation of an attachment or union with the womb, the tube etc., of the mother” (Meigs, 1852). It is also the definition used in the Code of Federal Regulations: “Pregnancy encompasses the period of time from implantation until delivery” (Code of Federal Regulations, 2015).

There are important physiological reasons to make this distinction between fertilisation and the onset of a pregnancy. Firstly, the majority of fertilized ova either never implant or fail during the early stages of the implantation process,
and never become recognized pregnancies. In fact, only 30-40% of fertilized ova implant and survive long enough to become clinically recognized by even the most sensitive tests. The remaining 60-70% of fertilized ova pass through the reproductive tract unnoticed (Cha, Sun, & Dey, 2012; Fox, Morin, Jeong, Scott, & Lessey, 2016; Macklon & Brosens, 2014; Meldrum, 2016; Meldrum & de Ziegler, 2016; Su & Fazleabas, 2015).

Another important aspect of reproductive physiology that supports the use of ACOG’s definition of pregnancy is that human chorionic gonadotropin (the hormone that suppresses menstruation during pregnancies and is detected in pregnancy tests) is not produced before implantation (Wilcox, Baird, & Weinberg, 1999). Further, the advent of artificial reproductive techniques (ARTs) like in-vitro fertilisation (IVF) allows fertilisation to happen months or even years before a pregnancy begins. During the IVF process, typically neither biological parent is present at the moment of fertilisation, and the maternal parent does not undergo any physiological changes that mark the beginning of a pregnancy while her ova are being fertilised. It is difficult, therefore, to argue that the person who contributed the ovum is pregnant at this stage.

In 2016, then Vice President-Elect of the United States, Mike Pence, proposed a piece of legislation in his home state, Indiana, that would require aborted and miscarried embryos and foetuses to be buried or cremated with the same formality as born people. In this context, if pregnancy is defined as beginning at fertilization, two thirds of these legally required funerary services would be for pairs of underwear and sanitary products like tampons and pads (Tuttle, 2016).
Nonetheless, those who disagree with the scientific community and the medical profession on this issue have considerable clout in the realms of law and politics. Hobby Lobby, a company that sells craft supplies, infamously won the right to ban their employees’ use of certain contraceptives that the owners of the corporation deemed “abortifacient” - including LNG-EC - by removing these medications from the company’s health insurance policy (Willis, 2014). The company’s lawyers argued that it was the business owners’ “firmly held belief” that these medications could prevent a fertilized ovum from attaching to the uterine wall of the user and that covering these medications in the company’s health insurance policy would violate the owners’ religious rights.

By contrast, at the same time that the Hobby Lobby case was being argued in the American courts, a group of Catholic bishops from Cologne, Germany handed down a religious ruling that LNG-EC was an acceptable form of “self-defence” for rape victims (Anderson & Sullivan, 2013). As the medication merely delays the natural functions of the body (ovulation) and does not harm a zygote, they ruled that using LNG-EC is an acceptable way for a victim of sexual assault to protect themselves from a continuing attack (in the form of viable sperm and the threat of impregnation) from their rapist. Unfortunately, the catalyst for this decision was the highly publicized case of a rape victim in Cologne being turned away from the emergency departments of not one but two different hospitals without receiving medical care before she was able to find a non-Catholic affiliated hospital².

² "A gynaecologist at St. Vincent’s Hospital in Cologne stated that the hospital did not conduct gynaecologic examinations after sexual attacks, to avoid having to advise about potential unwanted pregnancies.”
Both Hobby Lobby and the Catholic bishops considered fertilization to mark the beginning of a pregnancy, even though implantation marks the beginning of pregnancy by medical and legal definition, as we saw earlier. The precise mechanisms through which LNG-EC acts would therefore appear to be of great importance, as any misunderstandings of its operational processes have potentially deleterious implications for women’s health and well-being. If LNG-EC has any post-fertilization effects, many, regardless of the medical definition of pregnancy, will consider it an abortion drug and are likely to reject its use on moral grounds. In these circumstances, science communicators have a moral and professional obligation to provide the public with clear and accurate information on this issue.

The International Federation of Gynaecologists and Obstetricians (FIGO), as well as the International Consortium of Emergency Contraception (ICEC), have officially stated that the suppression of ovulation is the primary (and likely sole) mechanism by which LNG-EC prevents pregnancy; their stance is that LNG-EC cannot interfere with fertilised ova (International Federation of Gynaecologists and Obstetricians & International Consortium for Emergency Contraception, 2011). In the forthcoming section, I examine the clinical evidence for and against the different mechanisms of action that have been proposed for LNG-EC in the past when the exact mechanism was unknown, beginning at sperm transport and function and ending with uterine receptivity and implantation.
**Action on Sperm Transport and Function.**

One purported mechanism of action of LNG-EC is that it either impairs sperm transport through the reproductive tract or that it damages sperm cells in a manner that prevents them from fertilising an ovum if they should reach the Fallopian tubes (Brito, Bahamondes, do Nascimento, de Santis, & Munuce, 2005; do Nascimento et al., 2007; Hermanny et al., 2012). After sperm have travelled to the Fallopian tubes, they can adhere to the tubal epithelial cells for up to five days, where they are able to fertilize an ovum should one be released within that period.

The impact of LNG-EC on sperm function in vitro has been tested by recruiting people who have requested a surgical sterilization and who, despite being in good health and free from any tubal diseases or menstrual disorders, required a laparoscopic approach; the excised Fallopian tubes were perfused with semen, with the tube corresponding to the ovary with the dominant follicle carefully noted (Hermanny et al., 2012). A less invasive in vivo examination of the effect of LNG-EC on sperm function and cervical mucus (which would impair the transport of sperm into the uterus and Fallopian tubes) did not involve removing the Fallopian tubes, but instead flushed the uterus and Fallopian tubes in order to collect sperm for analysis (do Nascimento et al., 2007). In addition, each participant underwent an endometrial biopsy; this allowed the researchers to observe any changes in endometrial receptivity after LNG-EC use.

Both in vitro and in vivo studies of LNG-EC have found no effect in the number of motile sperm retrieved from the Fallopian tubes or their distribution throughout
the tubes, their adhesion to tubal epithelia, or in the acrosome reaction rate$^3$ – all important measures of sperm function and transport when assessing the likelihood of fertilization taking place (do Nascimento et al., 2007; Hermanny et al., 2012). These experiments show that LNG-EC has no significant effects on sperm cells or their movements through the female reproductive tract.

Since LNG-EC is typically taken after coitus, it is important to note that sperm can be recovered from the endocervix 90 seconds after an ejaculation and from the Fallopian tubes within 5 minutes (Gemzell-Danielsson, Berger, & Lalitkumar, 2014) whereas a dose of LNG-EC doesn’t begin to thicken cervical mucus (blocking the passage of sperm) until 9 hours after use (Croxatto et al., 2001). In conjunction with the evidence that LNG-EC does not significantly affect sperm function, this makes it unlikely that the contraceptive effect seen from taking LNG-EC is due to its action on sperm or cervical mucus.

**Action on Follicular Development and Ovulation.**

The most credible theory regarding the drug’s principal mechanism of action holds that LNG-EC delays or prevents ovulation until any sperm within the Fallopian tubes lose viability (i.e., become incapable of successfully fertilising an ovum). Every menstrual cycle, one ovary will begin to develop one ovarian follicle that is more mature and larger than the other follicles; luteinising hormone (LH) released by the pituitary gland then causes the follicle to further mature and release a fertile ovum. Approximately 24 to 48 hours before

---

$^3$ A chemical change in the membrane surrounding the head of a sperm cell to enable penetration of the ovum.
ovulation, LH concentrations in the serum and urine surge to levels that can be detected easily with an ovulation testing kit, which can be obtained from most local pharmacies in New Zealand at a similar price to LNG-EC (approximately NZD$30-40).

One of the least invasive ways to study the effect of LNG-EC on ovarian function is to compare the pregnancy rates between groups of participants who have taken LNG-EC before, during, and after the LH surge (as measured via urine samples) immediately prior to ovulation. Such an approach does not allow the investigation of post-fertilisation effects on the uterine lining, nor does it allow researchers to pinpoint the exact moment of ovulation. Nonetheless, it has the benefit of only requiring a urine sample from the participants, which is less invasive and less expensive than using blood samples or a biopsy. Furthermore, a more detailed examination of the effect of LNG-EC on follicular development and ovulation can be achieved through the use of ultrasonography to observe and measure the dominant follicle before and after administration of LNG-EC. This would allow investigators to ascertain if ovulation has been delayed or suppressed entirely for that menstrual cycle.

Marions, Cekan, Bygdeman, and Gemzell-Danielsson (2004) compared the effects of pre-ovulatory administration of mifepristone (the medical abortion pill, also known as RU486) and LNG-EC on follicle growth and ovulation in seven healthy, fertile volunteers. Participants were observed through one control cycle and two treatment cycles, each acting as their own control. Between treatment cycles, all participants had a treatment-free “wash out” cycle. One 10mg dose of mifepristone or two 0.75mg doses of LNG-EC 12 hours apart (1.5mg in total)
were delivered 48 hours before ovulation (as assessed by ultrasound). Both mifepristone and LNG-EC prevented ovulation in all subjects, either by permanently arresting follicle growth or by delaying follicle growth and release until the next menstrual cycle. This means that if unprotected intercourse had occurred any time in the week before the use of LNG-EC, there would not have been an egg for the sperm to fertilise.

By studying bleeding patterns in 69 volunteers, Tirelli, Cagnacci, and Volpe (2008) found that pre-ovulatory administration of LNG-EC (n=26) significantly shortened cycle length (by an average of 10.9±1 days). Using ultrasonography in a sub-group (n=8), they further verified that that pre-ovulatory treatment arrested follicle development and prevented ovulation in the 7 people who took LNG-EC prior to the LH surge. Prematurely arresting follicle development disrupts the normal menstrual timeline; to compensate, the next menstrual cycle begins ahead of schedule so that the suppressed follicle can finish developing and be released. The participants who took LNG-EC after the LH surge did not see any changes in their bleeding patterns because their cycles were not affected by LNG-EC use.

Croxatto et al. (2004) also used ultrasonography and found that treatment with LNG-EC suppressed ovulation in 93% of participants when administered when the dominant follicle was between 12-17mm in diameter, with diminishing success with follicles between 18 and 20mm. This demonstrates that the effectiveness of LNG-EC at suppressing ovulation is tied to the level of follicle development, with LNG-EC becoming less effective as the follicle grows in size. As the rate of anovulation and ovarian dysfunction seen in Croxatto et al.’s study
is very close to the overall success rate of LNG-EC, the authors concluded that it was "highly probable" that this was the main mode of action for this type of contraceptive. In other words, since the success rate for preventing ovulation is the same as the success rate for preventing pregnancy, it is very likely that LNG-EC works primarily or solely through preventing ovulation.

Novikova, Weisberg, Stanczyk, Croxatto, and Fraser (2007) used blood tests to measure LH levels in 99 women who requested LNG-EC and observed the pregnancy rates 4-6 weeks later in those who ingested LNG-EC before the LH surge and those who ingested it during and after the LH surge. The pregnancy rates of both groups were then compared to the pregnancy rates expected if there had been no intervention. Four pregnancies were expected in the pre-LH surge group but none were observed; 3 pregnancies were expected in the post-LH surge group and 3 pregnancies were observed. These results suggest that if LNG-EC has any post-ovulatory effects they are insufficient to significantly affect the pregnancy rate. That is to say, if LNG-EC had any effect on a fertilized ovum we would see fewer pregnancies in the post-ovulation group than expected; since the post-ovulatory group had no fewer pregnancies than expected, it is reasonable to conclude that there are no significant preventative post-fertilization effects from LNG-EC.
**Action on the Endometrium and Endometrial Receptivity to Implantation.**

Although we have already seen that LNG-EC has no significant effect on pregnancy rates when administered after ovulation, it is nevertheless worthwhile exploring what effects – if any – that LNG-EC has on the uterine lining. If LNG-EC has any significant effect on the uterine lining, it could theoretically impair endometrial receptivity to embryo implantation but not often enough to create a noticeable difference in pregnancy rates.

Because of the ethical implications of directly studying rates of implantation in human beings, human participants are sometimes recruited from groups of people who have already undergone a surgical sterilization or are in the process of obtaining the procedure. With the Fallopian tubes either occluded with ligatures or absent entirely, there is extremely little possibility of a receptive ovum coming into contact with viable sperm or implanting in the uterus (Palomino, Kohen, & Devoto, 2010). Another way to study the effect of LNG-EC on implantation is to use animal models (Müller, Llados, & Croxatto, 2003; Ortiz, Ortiz, Fuentes, Parraguez, & Croxatto, 2004) or human tissue samples in vitro (do Nascimento et al., 2007; Durand et al., 2005; Meng, Andersson, Bentin-Ley, Gemzell-Danielsson, & Lalitkumar, 2009; Meng, Marions, Bystrom, & Gemzell-Danielsson, 2010). At least one study has used a cell-culture model grown in a lab for the specific purpose of exploring the effects of LNG-EC and mifepristone on endometrial receptivity (Lalitkumar et al., 2007).
Examinations of endometrial receptivity have involved taking biopsies of endometrial tissue after the administration of LNG-EC, or culturing endometrial cells in vitro and exposing them to LNG-EC, before assessing markers of endometrial receptivity. These markers of receptivity include progesterone receptors AB and B (PR-AB and PR-B), oestrogen receptors, glycodelin-A (Gly-A), leukaemia inhibitory factor, vascular endothelial growth factor, L-selectin ligands (LS-L), and other immunohistochemical markers (such as αβ3 integrin cellular receptors.)

Palomino et al. (2010) recruited 38 women who had previously received a surgical sterilization and divided them into three groups. Group one (n=14) received a standard oral dose of LNG-EC (1.5mg of LNG) on the first day of the LH surge (LH 0). Group two (n=13) received a vaginal dose (1.5mg) on LH 0. The third group (n=11) received no treatment. All groups were biopsied twice, once at 48 hours after administration (LH +2) and 7 days after administration (LH +7); these days correspond with the days of ovulation (24 to 48 hours after LH surge) and implantation (5 to 7 days after ovulation). The LH surge was detected by measuring LH levels in urine and ovulation was confirmed through the use of transvaginal ultrasounds. The samples obtained from the biopsies were stained to detect LS-L, Gly-A, PR-AB, PR-B, and avβ3 integrin, all of which are considered important markers of endometrial receptivity.

A small number of biopsies from the oral LNG-EC group (3 out of 12) showed areas of glandular atrophy, but all markers of endometrial receptivity were otherwise normal. Progesterone receptor (PR) distribution was unchanged between the control group and the two treatment groups. The ratio of the
different PR isoforms was not affected by LNG-EC treatment. There were no changes in LS-L expression between the treatment groups and the control group, nor were there any changes in expression of αvβ3 integrin or of Gly-A. In light of these results, the authors of the study concluded that there are no direct or indirect effects of LNG-EC on endometrial function; that is to say, LNG-EC did not make the uterine lining less receptive to a fertilised ovum.

Meng et al. (2010) recruited 15 women, with proven fertility and no hormonal or intra-uterine contraceptive use for a minimum of three months before the study, for repeated use of either oral or vaginal LNG-EC treatment. The eight women in the oral LNG-EC group received twice the normal dose (3mg) in the form of four half doses (0.75mg) delivered at 24-hour intervals, and the seven women in the vaginal group received a single dose (1.5mg); the women each acted as their own controls, with biopsies taken during one control cycle and one or two treatment cycles, with a “wash-out” cycle between treatment cycles. The participants measured their own urine LH concentrations twice daily during the study period.

The oral group received 0.75mg of LNG each day from LH +1 to LH +4, covering the period immediately before and after ovulation, and the vaginal group received a single dose of 1.5mg of LNG on LH +2, either at or immediately after ovulation. Biopsies were taken from each participant during treatment and control cycles between LH +6 to LH +8, which correspond to the days on which we would expect to see embryo implantation.
The oral LNG-EC group biopsies showed a significant decrease in PR-A and PR-B staining, but no change in expression of PR was seen in the vaginal LNG-EC group biopsies. No changes were found in any of the endometrial markers studied in the vaginal LNG-EC group compared to control biopsies; this means that a single 1.5mg dose of LNG-EC is not enough to impair the ability of the uterus to accept a fertilised ovum even when delivered vaginally. Repeated exposure to larger than standard doses of LNG-EC is needed to alter the endometrium.

Meng, Andersson, et al. (2009) cultivated a 3-dimensional human endometrial cell culture model in order to directly explore the effects of LNG-EC and mifepristone on endometrial receptivity. Although the authors noted some changes between the control cultures and the cultures treated with mifepristone on a few of the immunohistochemical markers studied, the LNG-EC treatment group showed no differences to the control cultures group. Specifically they found no differences in oestrogen and progesterone receptors, androgen receptors, leukaemia inhibitory factor, interleukin-1β, vascular endothelia growth factor, cyclooxygenase-2, tumour necrosis factor-α, or integrin αvβ3 between the LNG-EC treated cultures and the control cultures. This means that the LNG-EC group didn’t exhibit any changes to the uterine lining that would prevent the successful implantation of a fertilised ovum.
Conclusion.

All of the studies discussed above found evidence that LNG-EC effectively suppresses ovulation when administered during the follicular stage, immediately prior to the LH surge and ovulation. None found evidence of any significant changes to endometrial receptivity, regardless of when or how LNG-EC was administered. These results are in line with the joint statement released by the International Federation of Gynaecology and Obstetrics (FIGO) and the International Consortium of Emergency Contraception (ICEC), which stated that LNG-EC acts primarily or solely through the suppression of ovulation. The accumulated findings clearly show that LNG-EC has no effect on fertilised ova. Any moralistic argument against the use of this contraceptive based on the premise that it harms an embryo is intrinsically erroneous. However, continued objections to the availability and use of LNG-EC despite this scientific consensus indicate that the objections could either be due to genuine ignorance of more nuanced aspects of reproductive physiology, or that language about implantation and embryos is being used as a smoke-screen.

Despite the evidence against LNG-EC having a significant effect on endometrial receptivity, the manufacturers of LNG-EC products are still required by the FDA to use language in their product information that strongly suggests that LNG-EC acts by preventing the successful implantation of an early embryo. Repeated petitions to the FDA to change its stance on product labelling, submitted on behalf of ACOG, have been rejected.
Levonorgestrel emergency contraceptives are both very safe and very effective, provided that they are taken before the luteinising hormone surge immediately prior to ovulation. In theory, then, LNG-EC should be a powerful tool for preventing a large proportion of the unintended pregnancies seen every year around the world. Unfortunately there are a number of substantial barriers between those at risk of an unintended pregnancy and the timely and effective use of LNG-EC or similar forms of emergency contraception.

Some of these barriers are physical, such as legal restrictions on the sale of LNG-EC and access to a supplying pharmacy. But the most difficult barriers to navigate are arguably the ones that exist in the minds of individuals. For people to benefit from easy access to LNG-EC they must first have an accurate understanding of their own risk of an unintended pregnancy. After that, they must know the correct time frame in which to use the medication as well as where to obtain an emergency contraceptive. People who do not realise they are at risk of having an unintended pregnancy will not seek out emergency contraception, nor will people who accurately perceive their risk but do not know of or understand the post-coital contraceptive options available to them.

Many people who realize they are at risk of an unintended pregnancy and are knowledgeable about LNG-EC nevertheless face hurdles in acquiring the drug. Some pharmacies refuse to stock such products or employ pharmacists that refuse to dispense LNG-EC for personal moral reasons. These refusals can have
dire consequences in rural communities with only one pharmacy, in which many at-risk people lack transport to another nearby town (Day, 2008). Even in situations where there are dispensing pharmacies within walking distance, the cost of LNG-EC can be prohibitive, especially if the at-risk person is a teenager or lives below the poverty line. Together, these barriers can represent a significant obstacle that might discourage individuals from seeking out and using LNG-EC, especially when they are uncertain about their risk of pregnancy to begin with.

In the next chapter, I examine the barriers mentioned above in greater detail.

**Lack of Risk Awareness.**

The first barrier to access and use of LNG-EC is the surprisingly complicated process of accurately assessing the risk of a pregnancy from an act of unprotected intercourse (UI) and feeling compelled to take preventative measures.

Biggs and Foster (2013) found that only 8% of the 1472 women they surveyed at family-planning clinics were able to accurately estimate their risk of conception from a single act of UI and 24% of their sample underestimated the risk of conception over a year of UI. The same study revealed that many participants were unable to correctly rate their risk of conception when using condoms (74% failed to predict), oral contraceptives (39%), or an IUD (44%).

In addition, Nappi, Lobo Abascal, Mansour, Rabe, and Shojai (2014) surveyed 7,170 women aged 16 to 45 from five European countries (France, Germany,
Italy, Spain, and the UK) and assessed these female respondents’ knowledge of emergency contraception. The authors found that 30% of the women had had at least one act of UI within the last 12 months. Of these respondents, the most common reason given for not accessing and using emergency contraception (EC) was “I didn’t think I was at risk of pregnancy” (46%) and that a further 19% simply didn’t think about the risk of pregnancy at all. The authors did not ascertain how many of the acts of UI resulted in a pregnancy.

Biggs, Karasek, and Foster (2012) surveyed 1,392 women in 13 family planning clinics in the United States and found that 46% had had at least one act of UI within the last 3 months. Foster, Higgins, Karasek, Ma, and Grossman (2012) surveyed 562 women seeking abortions in those same family planning clinics and found that the women had an average of 18 acts of UI before conceiving their current pregnancy (42%). An Australian survey (Hobbs et al., 2011) found that 57% of women did not use LNG-EC because they did not believe themselves to be at risk. Together, these studies indicate that a low perceived risk of pregnancy is among the most common reasons a woman chooses to forgo contraception.

This trend in women’s underestimating their pregnancy risk appears to be culturally universal. Xu and Cheng (2008), for instance, found that 99% of the Chinese teens surveyed at a Shanghai abortion clinic had had at least one act of unprotected intercourse in the past. In the cycle in which they became pregnant, 91% had used no contraceptive method but only 8.3% had used a form of emergency contraception (EC); 35% said that they did not believe that they were at risk of becoming pregnant. Meng, Gemzell-Danielsson, et al. (2009) also surveyed Chinese women seeking abortion and found that while 49% had used a
form of EC in the past, 82% had not used EC in the month they become pregnant because they did not believe themselves to be at risk.

Socioeconomic conditions clearly have an impact on women's decision-making concerning contraceptive use. Biggs and Foster (2013) discovered that African-American women, women with less than a college education, and women living below the poverty line were all more likely to underestimate the pregnancy risk associated with one year of UI. Moreover, African-American and Latina women, women living under the poverty line, and those with less than a college education were also more likely to overestimate the failure rate of condoms, oral contraceptives, and IUDs.

These patterns of contraceptive non-use are consistent with the unintended pregnancy rates in the USA, where 132 per 1000 women living in poverty experienced an unintended pregnancy, and the unintended pregnancy rates for African-American and Latina women were 82 and 91 per 1000, respectively; these socioeconomically disadvantaged groups experience unintended pregnancies more often than the national average of 50 per 1000 (Finer & Zolna 2011).

It is also important to note one troubling finding from Foster et al. (2012): that 16% of the women seeking a termination said that they were somewhat likely to have more acts of UI in the next 3 months and a further 6% said they were extremely likely to do so.

As we can see, the first challenge for the potential LNG-EC user is to accurately identify when they are at risk of becoming pregnant. Furthermore, there are
marked disparities among the women most likely to be at risk of an unintended pregnancy, with young, poor, and African-American and Latino women more likely to be at risk of becoming pregnant.

That the at-risk population is unaware of their need for LNG-EC is probably the most serious limitation of the effectiveness of the medication and its ability to decrease unintended pregnancy and abortion rates. Simply making the medication more available is not enough to overcome a serious deficit between the need to avoid pregnancy and the reproductive literacy required to do so effectively.

**Lack Of Emergency Contraceptive Knowledge.**

The next most significant barrier to access and use of LNG-EC is a lack of knowledge of the existence of emergency contraceptives, and how and when to use them effectively. Since LNG-EC came on the market as a dedicated product, as opposed to the confusing Yuzpe method, knowledge of emergency contraception has grown; nonetheless, there are still large areas of the world where the concept is virtually unheard of, let alone understood well enough to be of practical use to those in need. Misconceptions about the time frame in which LNG-EC can be used, the mechanism of action, and potential side effects are common (Baxter et al. 2011, Johnson et al. 2010).

LNG-EC is unable to help those who do not know how to obtain and use EC effectively. As we saw above, there are disparities in knowledge and
understanding of pregnancy risk. We can see these same disparities again in EC knowledge; wealth, race, and education are all factors that strongly predict whether or not a person has the level of EC knowledge necessary to access it when needed and use it effectively to prevent pregnancy.

Those who have never heard of the concept of EC are unlikely to seek it out, as are those who wrongly believe that it is unavailable to them in their community. Those who do know of EC and know where to obtain it can still be prevented from using it effectively if they have incorrect beliefs about the time frame in which it is effective and the mechanism of action and side effects. Fears of serious short and long-term side effects, such as intense vomiting and permanent sterility, are common and are frequently cited as reasons not to use LNG-EC (Aiken, Gold, & Parker, 2005; Bumbul et al., 2013; Hobbs et al., 2011; Kisa, Zeyneloglu, Yilmaz, & Verim, 2012; Meng, Gemzell-Danielsson, et al., 2009; Mollen, Barg, Gotcsik, Blades, & Schwarz, 2008; Rossella E. Nappi et al., 2014; Picavet, van der Vlugt, & Wijsen, 2014; Xu & Cheng, 2008; Yen, Parmar, Lin, & Ammerman, 2015)

In this section we shall discuss the literature documenting knowledge gaps and the factors that prevent people in need of EC from accessing and using it effectively.

Global Perspective.

The Demographic and Health Survey (DHS), a very large, population-level household survey of 45 countries conducted between 2000 and 2012, asked
women between the ages of 15 to 49 in Africa, Asia, Eastern Europe, and Latin America whether they had heard of or used any form of EC. EC knowledge ranged from 2% of women in Chad and 66% in Colombia. Use of EC ranged from 0.1% in Chad and 12% in Colombia.

This survey found that younger, poorer, and less educated women were much less likely to have ever heard of EC. More affluent, urban, and married women were more likely to have heard of EC. Two serious limitations of this survey are that all of the countries surveyed are developing nations, and that in Egypt, Indonesia, Jordan, the Maldives, Pakistan, and Turkey only married women were allowed to take part. This study also did not ask the participants about specific aspects of EC knowledge, such as the correct time frame in which to use EC.

**Knowledge of LNG-EC in Africa.**

More detailed studies of EC knowledge in African countries have been conducted in Ethiopia, Ghana, Kenya, and Nigeria. Knowledge rates among university students vary between African countries (60.6% of Nigerian students had ever heard of EC, compared with 68.9-84.2% of Ethiopian students (Ahmed, Moussa, Petterson, & Asamoah, 2012; Awoleke, Adanikin, Awoleke, & Odanye, 2015; Nibabe & Mgutshini, 2014) but university students were consistently more knowledgeable than their less educated counterparts (31.2% of non-university educated Nigerians had ever heard of EC, compared with 10.1% of non-university educated Ethiopians (Morgan, Keesbury, & Speizer, 2014; Tesfaye,
Tilahun, & Girma, 2012). The rates of knowledge seen in Ghana, Kenya, and Nigeria are in line with the rates seen in the DHS.

Tesfaye et al. (2012) found very low rates of EC knowledge (10.1%) among women seeking abortions at a medical clinic in Ethiopia, but Abate, Assefa, and Alemayehu (2014) found much higher rates of knowledge (41.5%) among abortion patients in the same country just two years later. However, Abate et al. also found that only 18.5% of their participants knew the correct time frame in which to use EC effectively. In contrast, Ahmed et al. (2012) found very high rates of EC knowledge among Ethiopian university students, with 84.2% having heard of EC, 64.4% knowing the correct time frame, and 78.3% knowing where they could purchase EC for themselves if the need arose. Unfortunately, they also found that 7.6% of participants also believed that EC could cause HIV.

**Knowledge of LNG-EC in Asia.**

More detailed studies of EC knowledge in Asia have been conducted in recent years in China, India, Korea, Lao, and Nepal.

EC knowledge in India is greatly affected by education levels, with Rahman, Khalda, Kar, Kharka, and Bhutia (2013) finding that 40.6% of a disproportionately well-educated population attending a gynaecology clinic had ever heard of EC, but that only 6.4% of the illiterate patients had heard of EC. This is consistent with the findings of the DHS, which found that 10.7% of Indian women had ever heard of EC, and Rocca, Shankar, Sreevathsa, and Krishnan (2013), which found that only 7.8% of Indian women had heard of EC.
Even among the disproportionately well-educated population in Rahman et al. 2013, only 28% knew the correct time frame for LNG-EC use and only 44% knew that it was available without a prescription.

University students from Korea and Nepal had high rates of knowledge of EC, with 76.3% and 68% having heard of EC, respectively (Adhikari, 2009; Kang & Moneyham, 2008). However, less than half of the Korean students knew the correct time frame in which to use EC or where to purchase EC and 20% said that LNG-EC was the same as the medical abortion pill.

Xu and Cheng (2008) found that less than half of the teenage patients at an abortion clinic were familiar with the concept of EC; when asked to describe methods of EC, some participants described folk remedies such as drinking cold water or jumping after sex to prevent pregnancy. Reasons for not using EC to prevent an unintended pregnancy included lack of knowledge of EC (57%), lack of knowledge pregnancy risk (35%), not knowing how to use EC (2.8%), worries about potential side effects (2.0%), and not knowing where to obtain EC (1.1%). Only 35% of the teens knew the correct time frame in which to use EC, and 82% of EC failures were caused by user error.

Meng, Gemzell-Danielsson, et al. (2009) found that 77% of women seeking an abortion in a Shanghai abortion clinic had heard of EC and 49% had used EC. They also found that women with only a primary or high school education were the least likely to have used EC or contraception in general. Teenagers and women over 40 were also less likely to use EC or other contraceptive methods and more likely to under-estimate their risk of pregnancy. Of the women who
had used EC in the past, 73% did not use EC in the cycle they became pregnant because they did not understand that they were at risk of becoming pregnant.

The findings of Meng et al. and Xu et al. are of particular interest because EC is widely available and inexpensive in China. LNG-EC has been available without prescription since 1998 and mifepristone EC has been available since 2001, although the majority of women (95.5%) used LNG-EC. Despite the easy access to LNG-EC, it is not used in the majority of cases of UI and user error rates are very high; this shows that simply making LNG-EC accessible is not enough to ensure effective use.

**Knowledge of LNG-EC in Americas.**

North and Latin American countries have been studied more frequently than those of other continents, particularly the United States of America.

Surveys of university students in the United States of America in the last ten years or so have found that the rates of knowledge of the existence of at least one form of EC are quite high, ranging from 73% to 98% (Corbett, Mitchell, Taylor, & Kemppainen, 2006; Hickey, 2009; Mackin, Clark, McCarthy, & Farris, 2015; Miller, 2011; Mollen, Barg, Hayes, et al., 2008; Vahratian, Patel, Wolff, & Xu, 2008; Yen et al., 2015). The usage rates reported in these studies have also been relatively high, ranging from 12% (Corbett et al. 2006) to 98% (Hickey, 2009; Mackin et al., 2015).
Unfortunately, while a clear majority of US university students have heard of at least one form of EC before, many of these same students are unsure about the time frame in which EC can be used, the availability of EC (either in terms of over-the-counter (OTC) status or which pharmacies or clinics it can be obtained from), the mechanism of action, and the difference between EC and a medical abortion.

Knowledge about the correct time (72 hours after unprotected sexual intercourse) ranged from 28% (Miller 2011) to 94% (Lehan Mackin et al. 2014); Vahratian et al. found that only 45% of the students in their study knew the correct time frame in which to use EC.

Miller et al. also found that only 15.5% of students knew that EC was available on campus, and that 60% did not know where to obtain EC off-campus and 64% reported they would not know where to obtain EC if they needed it while out of town. Lehan Mackin et al. found that while 72.2% knew that EC can be purchased without a prescription and 88.4% knew it was available from the local family planning clinic, only 51% knew it was available on campus from student health services and only 46.4% knew it could be obtained after-hours from an emergency treatment centre.

Hickey and Corbett et al. both found that high percentages of students knew that EC was available for purchase in the US (95% and 82.5% respectively), but did not ask if the students knew where on campus they could buy EC. This is an important distinction to make, because while EC is theoretically available without prescription to all ages in the USA, two studies have found that only slightly more than half (52.2% and 66.9%) of universities in America prescribe
and make EC available to their students on campus (McCarthy, 2002; Trieu, Shenoy, Bratton, & Marshak, 2011).

North American university students have exceptionally high levels of EC knowledge; their teenage counterparts are also more knowledgeable than average, but less so than their university educated peers. Aiken et al. (2005) and Mollen, Barg, Hayes, et al. (2008) both found that 73% of the teens they surveyed and interviewed had heard of at least one form of EC while Ahern, Frattarelli, Delto, and Kaneshiro (2010) found that only 56% teens they surveyed were familiar with the concept of EC. Only about half of these teens knew the correct time frame in which to use EC, and knowledge of availability ranged from 23% to 95% (Ahern et al., 2010; Aiken et al., 2005; Mollen, Barg, Hayes, et al., 2008).

Unfortunately, Mollen (2008) found that 40% of the teens interviewed were unable to answer any of the follow up questions about EC and Aiken found that 46% of the teens surveyed said that LNG-EC was the same as the medical abortion pill, mifepristone.

Knowledge among Latin American countries varied widely; Pichardo et al. (2014) found that 83% of Argentinians were familiar with the concept of EC, whereas García et al. (2008) found that only 4% of the Mexican factory workers surveyed had ever heard of EC. Lathrop et al. (2013) found that 58% of Haitians were familiar with the concept of post-coital contraception, but that most of their knowledge related to folk remedies such as drinking salt water or rubbing their abdomen with a lemon after sexual intercourse. Less than 1% had ever used a modern EC, with providers in the country stating that they dispense LNG-EC only in the case of sexual assault.
**Knowledge of LNG-EC in Europe.**

Knowledge of the existence of LNG-EC is quite high in European countries, with several studies taking this knowledge for granted when conducting their surveys (Cameron, Gordon, & Glasier, 2012; R. E. Nappi et al., 2014; Picavet et al., 2014), but lower in Turkey (Bozkurt et al., 2006; Kisa et al., 2012).

Falah-Hassani, Kosunen, Shiri, and Rimpelä (2007) surveyed Finnish teens and found that LNG-EC knowledge and use increased dramatically between the ages of 12 and 18. Of 12 year olds, 61% had heard of LNG-EC before but none had used it; of 14 year olds, 96% had heard of LNG-EC but only 2% had used it. Nearly all 16 and 18 year olds had heard of LNG-EC before (98-99%), and usage rates were 15% for 16 year olds and 29% for 18 year olds.

Nappi et al. (2014) found that 56% of the women surveyed thought that LNG-EC lost effectiveness after 24 hours and 10% believed that LNG-EC would cause sterility. Picavet (2014) surveyed Dutch women and found that only 43% knew that LNG-EC was available without a prescription and only 18% knew that it could be used after the first 24 hours after an act of unprotected intercourse.
Scotland presents an interesting example of the effect of subsidising LNG-EC; since 2008 LNG-EC has been available free of charge and without a prescription from Scottish pharmacies (Cameron et al. 2012). However, a survey of Scottish women seeking an abortion found that only 70% were aware of the availability of LNG-EC, with wealthier women more likely to be aware of availability than poorer women. Women 16 years and younger and women over the age of 35 are also much less likely to know that LNG-EC is available free of charge. Overall, 61% of the women surveyed had used LNG-EC at least once in the past, but only 11% had used it in the cycle in which they became pregnant. Cameron et al. found no significant association between awareness of LNG-EC being available free of charge in pharmacies and actual use of LNG-EC, which suggests that a perceived lack of pregnancy risk plays a significant role in the decision to use LNG-EC.
**Role of Education in EC Knowledge.**

Several of the studies discussed above have found that level of education is a strong predictor of perceived pregnancy risk, EC knowledge, and likelihood of having an unintended pregnancy (Biggs & Foster, 2013; Biggs et al., 2012; Goldsmith, Kasehagen, Rosenberg, Sandoval, & Lapidus, 2008; Meng, Gemzell-Danielsson, et al., 2009; Rahman et al., 2013; Westley, Kapp, Palermo, & Bleck, 2013). Particularly affected were those who were illiterate or had only a primary school education; having a secondary or tertiary education was protective against an unintended pregnancy and associated with higher use and knowledge of LNG-EC and contraception in general.

From a purely clinical point of view, high risk populations are not being targeted effectively and because of this LNG-EC is not being used where it has the greatest potential to prevent unintended pregnancies. From a sociological point of view, missed opportunities to use LNG-EC to prevent an unintended pregnancy serve to widen existing disparities in society; in many countries abortion care is unavailable or prohibitively expensive and foster care systems are already overburdened with children not adequately cared for.

**Role of the media in EC Knowledge.**

Of the 40.6% of Sikkim women surveyed by Rahman et al. (2013) who had heard at least one method of EC, 77.1% said that their primary source of information about EC was TV or Radio. Ahmed et al. found similar rates in Ethiopian students, 76% of whom had obtained their EC knowledge from the media. The media was
also cited as a source (2-43%) in a number of other studies about LNG-EC knowledge (Ahern et al., 2010; Amalba, Mogre, Appiah, & Mumuni, 2014; Arinze-Onyia, Aguwa, & Nwobodo, 2014; Awoleke et al., 2015; Corbett et al., 2006; Sychareun, Hansana, Phengsavanh, & Phongsavan, 2013; Tesfaye et al., 2012; Vahratian et al., 2008; Xu & Cheng, 2008).

That the media is one of the most common sources of information about LNG-EC is a worrying trend. When newspaper coverage of LNG-EC between 1992 and 2002 was analysed it was found that 52% of newspaper articles contained only incorrect statements about LNG-EC and 44.5% presented LNG-EC as being the same as a medical abortion (Pruitt & Mullen, 2005). Furthermore, when looking at the sources cited in newspaper articles about LNG-EC, over 90% of the specific attributions and 40% of the “general” attributions were to activist, religious, or political figures or groups. Only 9% of specifically named individual sources were medical professionals or groups and the majority of “general” attributions (56%) were referred to vaguely as “some people”, as in “some people say…”

Plan B, the most well known brand of LNG-EC is required by the FDA to state in all of their product information that LNG-EC can prevent implantation. In New Zealand, the Ministry of Health website also claims that LNG-EC can prevent implantation; the website also states that the time period in which you can use LNG-EC after an act of unprotected sexual intercourse is 120 hours, or five days, which is at odds with the currently recommended time frame of 72 hours.

A consequence of having supposedly trusted and medically accurate sources providing misinformation is that media outlets are likely to continue repeating falsehoods about LNG-EC even if they do cite medical sources. It is little wonder
that myths about LNG-EC are so prevalent among the lay public. As we will see in the next section on the confusion between LNG-EC and medical abortion, misinformation is not confined purely to journalistic sources.

**Confusion between EC and Abortion.**

Confusion between EC and the abortion pill, mifepristone (RU486), is very common. Only two studies found that the perception that LNG-EC is an abortifacient drug was rare: Garcia et al 2008, which found that only 3% of the Mexican factory workers surveyed held this view, and Rahman et al. 2013, which found that only 6% of their sample believed the same.

Kang and Moneyham (2008) found that 20% of the Korean students surveyed were sure that LNG-EC was the same as the medical abortion pill and a further 52% were unsure. Sychareun et al. (2013) found that 36% of the Laotians surveyed held the same belief.

In Europe, Nappi et al., 2014 found that overall 31% of their survey population believed that LNG-EC was the same as the medical abortion pill, ranging from a low of 24% of women from the UK to a high of 45% of women from Italy. Bumbul et al., 2013 found the same belief in 41% of Poles and 58% of Lithuanians. While Kisa et al., 2012 did not ask their study population if they considered LNG-EC to be an abortion pill, they did report that 92% of their respondents categorized use of LNG-EC as being a sin.
This confusion between LNG-EC and abortion pills was quite common in the United States, with Aiken et al., 2005 (46%), Corbett et al, 2006 (38%), and Hickey 2009 (48%) all reporting similar rates. Lehan Mackin et al. stood out, as they found that 71% of the students surveyed thought that the drug used in EC pills was the same as mifepristone and 88% thought that EC pills could be used to terminate a pregnancy any time in the first trimester.

This particular myth about LNG-EC (that it is an abortion pill or contains mifepristone) is so well entrenched in popular imagination that it featured as a story arc in the second season of the popular TV show *The Walking Dead*; in episode six, “Secrets”, Lori decides to end a pregnancy by asking another character, Glenn, to go on a life-threatening mission to a zombie-infested pharmacy to obtain several packets of LNG-EC. Having almost died during the trip to the pharmacy, another character, Maggie, throws the packets of LNG-EC at Lori while angrily saying, “Here are your abortion pills”. Later in the episode, Lori makes herself vomit after swallowing the pills after she decides to carry her pregnancy to term, even though the pills would not have had any effect on her foetus.

**Institutional Barriers to LNG-EC Use.**

Now that we have outlined the factors that lead up to the decision to seek out LNG-EC after unprotected intercourse (or not seek it out, as the case may be), we shall explore the institutional barriers that prevent the timely administration of the medication.
In many countries LNG-EC has been granted over the counter status, meaning that it is now theoretically possible to avoid a consultation with a doctor before obtaining LNG-EC. However, potential users of LNG-EC who attempt to purchase the drug without a prescription from a pharmacy are still subject to the whims of the dispensing pharmacist on duty and the policies of the clinic or pharmacy that employs them.

Although it is rare that local laws explicitly give pharmacists the right to completely impede access to LNG-EC (most states and countries require objecting pharmacists to at least refer to another pharmacist to ensure a continuance of care), it is not rare for a pharmacist to refuse to dispense LNG-EC or to behave inappropriately towards the customer requesting it (“Pharmacy Refusals 101,” 2015). Even in cases when pharmacists make a referral to another pharmacy, this refusal can represent a serious burden to a person attempting to prevent an unintended and unwanted pregnancy. The distance to the nearest pharmacy can be considerable and the delay in receiving the medication can mean that it is taken too late to be effective (Day, 2008).

Pharmacists are sometimes rebuked by the organisations that regulate their profession, but that process occurs over the course of months or years and is little comfort to those who suffer the immediate consequences of being refused access to LNG-EC. On top of that, the penalties for abusing their authority over their customers are seldom harsh. For example, in January 2006, a pharmacist named David Becker-Ellison in California not only refused to fill a prescription for LNG-EC but also refused to return the prescription and berated the customers publicly for being “irresponsible”. The only consequence Becker-
Ellison faced for this serious incident of malpractice was a $750 fine from the California Board of Pharmacy (Beckner, 2006).

Even when the pharmacist or physician on duty in a pharmacy or medical clinic has no moral objection to prescribing or dispensing LNG-EC, the company or institution that employs them may have a policy against dispensing the medication in certain circumstances, or may not stock it at all. For example, on November 1st, 2015, Norwegian Cruise Lines implemented a new policy that removed all employee access to LNG-EC unless they had been raped or sexually assaulted.

**Company Policy Restricting LNG-EC Access.**

Until late 2006, Wal-Mart had a national policy against stocking LNG-EC in any of its stores (Dailard, 2005). It wasn’t until a lawsuit was launched in the state of Massachusetts (with the promise of more lawsuits in state after state until the policy was changed) that Wal-Mart began to stock the medication (Gee 2006). Wal-Mart represents the third largest chain of pharmacies in the United States, after Walgreens and the CVS Corporation, with over 10,000 pharmacists employed in 4,403 stores nationwide; it seems incredible that such a commercial behemoth would have such a policy in the first place.

Dr Gee, the physician behind the first lawsuit in Massachusetts became the target of a vicious campaign of harassment in her workplace and home, in part spurred on by the bloviating of radio personality Rush Limbaugh (Gee 2006). She even
received a letter that referred to her as “Hitler” and accused her of orchestrating a Machiavellian scheme to “depopulate” the human race. 4

As mentioned earlier, Norwegian Cruise Lines recently implemented a policy that prohibits their employees from accessing LNG-EC – either free or for purchase – unless they cite sexual assault as their reason for needing the medication. These employees often spend days, weeks, or even months at sea; further, their ability to disembark from their ship depends on their citizenship and the countries that the ship is visiting. For example, employees that are not U.S. citizens are prohibited from leaving their ship in New York City. As these employees do not have access to any alternative sources of medical care, this new policy presents a serious hardship for any employees that find themselves in need of an emergency contraceptive.

Employees with the cruise line (speaking anonymously due to another company policy that effectively gags them) speculate that this harsh new policy is the result of a recent change in management; in January 2015, Frank Del Rio took over as president and CEO of the company. Since the policy came into effect, at least one employee has allegedly become pregnant after being refused timely access to LNG-EC (Rothkopf, 2016).

Residents of rural areas are more greatly affected by policies against stocking LNG-EC or selling it without a prescription. Small towns often have just one or two pharmacies; residents have very few options if an institutional barrier to LNG-EC is put in place. A 2007 study of Californian pharmacies (Bigbee et al.,

---

4 For my own efforts, I have been accused of belonging to the “Jesuit Depopulation Squad”.  

37
2007) found that 8 of the 13 (62%) rural counties in the study had no pharmacies that stocked LNG-EC.

Even if rural pharmacies do stock LNG-EC, these pharmacies often have restricted open-hours compared to their urban equivalents. A 2006 study of Pennsylvania pharmacies (Chuang & Shank, 2006) found that urban and rural pharmacies were equally likely to stock LNG-EC (30% vs. 34%) but that rural pharmacies were significantly less likely than urban pharmacies to be open during the evening hours (63% vs. 93%).

A Canadian study of LNG-EC availability in Ontario (Dunn, Brown, & Allred, 2008) found that although only one urban pharmacy in their study was closed both Saturday and Sunday, 15% of the rural pharmacies surveyed were shut all weekend and 75% were shut on Sundays. The same study found that 80% of urban pharmacies were open during evening hours, compared to just 24% of rural pharmacies. Since the optimal period in which to take LNG-EC after unprotected intercourse is 72 hours (and the rate of effectiveness drops considerably with each hour after the first 24 hours), a rural community with a single pharmacy that closes early on Friday and does not open again until Monday morning would be a serious impediment to timely administration of LNG-EC.

The entire New Zealand town of Wairoa is served by a single pharmacy – a pharmacy that refuses to sell LNG-EC over the counter (S. Lewis, 2016). The owner of this pharmacy, Elsa Norvil, believes she is within her rights to enforce

---

5 This study also asked what options staff at the pharmacies that did not stock LNG-EC would offer patients in need; the most common answer was to refer the patient to another pharmacy (44%), but at least one pharmacist responded by saying “we would tell her to have the baby.”
her views on an entire township: “I am not prepared to supply the pill over the counter, as I see conception as a potential life, with a soul, so I will not sell it as I consider this as ending another’s life.” She is, however, prepared to dispense the medication if the request for it is accompanied with a prescription from a doctor. It is difficult to know what to make of her ethical convictions. Do potential lives lose some of their value if the person incubating them has been sufficiently inconvenienced?

**Medical refusal to dispense or prescribe.**

Since LNG-EC first became available commercially as a discrete product (instead of a combination of pills used in the Yuzpe method), it has been surrounded by controversy and elicited strongly negative emotional responses from small but vocal factions within the media, the lay public, and the medical profession. Although the majority of pharmacists, nurses, and physicians have no ethical qualms about making LNG-EC available to their patients, some of their colleagues have serious misgivings about the medication and those that use it.

A 2010 study surveyed obstetrician-gynaecologists to explore the attitudes and beliefs these physicians hold about LNG-EC and the effect it has on the sexual behaviour of their patients (Lawrence, Rasinski, Yoon, & Curlin, 2010). They found that although 89% of their respondents believe that access to LNG-EC will result in fewer unintended pregnancies, less benevolent views are also common; 27% believe that those who use LNG-EC will abandon more effective methods of contraception, 12% believe access will cause their patients to initiate sex at a
younger age, and 15% believe that LNG-EC will cause their patients to have a larger number of sexual partners.

Lawrence et al. also discovered that only 51% of obstetrician-gynaecologists (OBGYNs) would offer LNG-EC to all patients who believe that they are at risk of an unintended pregnancy. Alarmingly, 6% stated that they would offer LNG-EC only to those who have been sexually assaulted and a further 6% would withhold LNG-EC even in the immediate aftermath of rape.

Lawrence et al. were able to identify some significant associations between attitudes and practices and the personal characteristics of the physicians surveyed. They found that male doctors were less likely than female doctors (87% vs. 91% of females) to believe that LNG-EC could lower unintended pregnancy rates. Religiosity was also correlated with this belief; doctors who attended religious services twice a month or more were less likely than doctors who never attended to believe that LNG-EC was an effective way to avoid unintended pregnancies (84% vs. 95%).

Although 12% of all the physicians surveyed believed LNG-EC access would encourage an earlier sexual debut (coitarche), only 7% of female physicians held this belief compared to 17% of male physicians. Overall, 15% of physicians stated that LNG-EC access would encourage women to have more sexual partners, but physicians who attended religious services often were four times as likely to hold this view than those who never attend (22% vs. 7%). Disturbingly, male physicians were more likely to never offer LNG-EC or offer it only in the case of sexual assault (15% vs. 8% of female physicians).
Significantly, Lawrence et al. found that physician’s beliefs about LNG-EC were associated with their willingness to prescribe the medication. For example, physicians that indicated they believe that access to LNG-EC encourages women to have a greater number of sexual partners were less likely to prescribe LNG-EC to all who request it than those that indicated they do not hold that belief (29% vs. 55%). Similarly, those who believe that LNG-EC access encourages an earlier sexual debut were less likely to prescribe than physicians who do not hold that view (32% vs. 54%), as were those who believe that LNG-EC access discourages the use of more reliable forms of contraception (34% vs. 58%).

Richman et al. (2012) explored the role that knowledge of LNG-EC played in pharmacists’ decisions to dispense or withhold LNG-EC. They surveyed Florida pharmacists and found that 46% believe it is an abortion pill, and that 56% believe that LNG-EC causes birth defects when unsuccessful at preventing a pregnancy. Those pharmacists that answered correctly that LNG-EC does not induce abortion were much more likely to dispense the medication than those that answered that question incorrectly (OR= 4.64, 95% CI 2.15-10.00). Overall, they found that better knowledge of LNG-EC was the strongest predictor of dispensing practices.

The results of Richman et al. (2012) are consistent with those from an earlier study (Bennett, Petraitis, D’Anella, & Marcella, 2003) conducted before LNG-EC achieved OTC status. Using a “mystery shopper” telephone survey, the authors found that only one third of the pharmacists surveyed were able to cite the correct timeframe in which to take LNG-EC after unprotected intercourse and
13% stated that the medication acted by causing an abortion. Pharmacists who presented correct information during the survey were more likely to either dispense the medication or refer the caller to another pharmacy where they could obtain LNG-EC; for example, those that correctly noted that LNG-EC required a prescription (at the time) were 3.12 (95% CI 1.34-7.28) times more likely to help the caller obtain the medication. Conversely, the pharmacists that claimed LNG-EC is an abortion pill were much less likely to help the caller access LNG-EC (OR 0.35, 95% CI 0.13-0.91).

Although we can assume that many of the practicing pharmacists surveyed by Richman and Bennet received their training before LNG-EC became a widely used form of emergency contraception, the same cannot be said of recent pharmacy students.

Ragland and West (2009) surveyed pharmacy students at the University of Arkansas in 2006, the year that the FDA approved non-prescription sale of LNG-EC. They found that 33% believed that LNG-EC acts by dislodging an implanted embryo and 35% specifically identified mifepristone (RU486, the medical abortion pill) as the main component of emergency contraceptive pills. They also found that although 92% of the students disagreed that LNG-EC should be available without counselling from a pharmacist, only 27% considered themselves competent enough to give that counselling. Further, 30% of the students felt uncomfortable dispensing LNG-EC because of moral or religious reasons.
If we take the objection to dispensing LNG-EC at face value – i.e., that LNG-EC is deemed unacceptable because of the effect it has on embryos – then it should be comforting to the conscientious objectors to learn that LNG-EC has no post-fertilisation effects. It would also be logical to assume that this concern for embryos would cause these pharmacists and physicians to boycott other medications that can prevent embryo implantation. However, neither of these things is true.

Cooper, Bissell, and Wingfield (2008) performed a series of qualitative interviews with pharmacists in the UK to explore their feelings about dispensing LNG-EC to the public. Even when confronted with the evidence that LNG-EC has no post-fertilisation effects, one interview participant said: “I think it causes abortion. They say it doesn’t but that’s what I think…” Interestingly, the same participant also said that she is willing to dispense the medication if the patient in question has obtained a prescription from a doctor first: “Yea, I'll let somebody else make that decisions – but not me. I mean, maybe that’s a cop-out, I don’t know, but that’s how I feel.”

Other researchers (Davidson, Pettis, Joiner, Cook, & Klugman, 2010) have taken the novel approach of asking pharmacists in Nevada about a range of ethically contentious medications they could be called upon to dispense. Almost 6% of the Nevada pharmacists surveyed said that they would refuse to dispense and refuse to refer for at least one of the five medications they were asked about. The drugs used in the survey were erectile dysfunction medication, emergency contraception, oral contraceptive pills, fertility drugs, and medical abortifacients.
They found that the least reviled drug on this list was oral contraception. The most controversial drug was, not surprisingly the medical abortifacient, with emergency contraception coming in second place. Importantly, 98% of the pharmacists had no moral objections to dispensing oral contraceptive pills; unlike LNG-EC, these have been shown to alter the uterine lining and prevent embryos from implanting successfully, so we would expect to see as much moral outrage directed at these pills as towards LNG-E. However, only 85% of the pharmacists were comfortable dispensing LNG-EC, despite the medication having no post-fertilisation effects.

Ninety-three per cent of the pharmacists had no moral objection to dispensing erectile dysfunction drugs even though these could plausibly be used to facilitate premarital sex, adultery, or even rape. In comparison, only 91% of the pharmacists had no moral objection to dispensing fertility drugs. This means that (in Nevada, at least) facilitating erections is somewhat less morally objectionable than helping a couple conceive.
The Experiment

Introduction.

As shown earlier, negative attitudes towards LNG-EC emergency contraceptive pills are common and there is a wealth of documented incidents where these negative attitudes have prevented people at risk of an unintended pregnancy from accessing LNG-EC in a timely fashion. Both the public and the medical professionals that prescribe and dispense the medication make frequent references to abortion when talking about the medication with researchers (Bennett et al., 2003; Chuang & Shank, 2006; Cooper et al., 2008; Rossella E. Nappi et al., 2014; Pruitt & Mullen, 2005; Ragland & West, 2009; Yen et al., 2015).

Aims.

The present study is designed to assess the extent to which inaccurate language about implantation affects the public's beliefs about LNG-EC's mechanism of action and the attitudes they hold towards the medication because of those beliefs.
The pilot study and the experiment were designed to investigate whether disapproval of LNG-EC is driven by the (mistaken) belief that LNG-EC prevents pregnancy by impairing the ability of a newly fertilized embryo to implant in the uterine lining and become an established pregnancy. Specifically, I have set out to answer the following two questions:

- Are people who believe that LNG-EC prevents the successful implantation of a new embryo more likely to hold negative views about the medication and the people who use it?
- Are these individuals also less likely to support easy access to this medication for people at risk of an unintended pregnancy?

**Methods.**

To achieve these aims, I devised three priming texts and a survey tool. Although the priming texts remained largely unchanged between experiments⁶, the survey tool was refined after the pilot study was completed. These texts were created by making subtle changes to the information provided by the Ministry of Health (MOH) webpage on emergency contraception, which currently states (erroneously) that LNG-EC can prevent implantation in some cases.

---

⁶ The name of the drug in the text was changed from ‘Postinor’ to ‘Plan B’, and references to the ‘Family Planning Association’ were changed to ‘Planned Parenthood’; both of these changes were made to avoid confusing the North American participants in the second experiment.
After volunteers were recruited to the study, they were assigned to one of the three priming text groups before beginning the survey.

**Priming Texts.**

The first text (T1) has been altered to reflect the findings of the International Federation of Gynaecology and Obstetrics (FIGO) and the International Consortium of Emergency Contraception (ICEC), i.e. that LNG-EC works by suppressing ovulation and that language implying the medication impairs endometrial receptivity and the implantation process is inappropriate. The second text (T2) was created by rewording the section in the MOH webpage about implantation to make the implications of that alleged mechanism of action clear to the participants. The third text (T3) was created by completely excising the mechanism of action section from the MOH text.

The purpose of these priming texts was to discover if the different biochemical mechanisms presented to the participants influence their attitudes towards LNG-EC and their likelihood of using the medication in the future should the need arise. Ostensibly, moral objections to the availability and use of LNG-EC are
driven by a concern that embryos, described sometimes as “unborn children”, are harmed by the medication. If this is the true source of these objections, then we would expect to see these objections and negative attitudes largely disappear after participants in T1 have been informed that LNG-EC cannot impair the ability of an embryo to implant or harm the embryo in any other way. We can also expect that the T2 group, having been assured that LNG-EC can prevent embryo implantation, will have reservations about the medication, both for their personal use and that of others, out of a concern for embryos that could theoretically be harmed.

The Survey Tool.

In the pilot study, the survey began with the priming texts and then moved on to the questions about LNG-EC. In the experiment, the survey began with the participants being asked about their prior experience with contraception, including LNG-EC, as well as which sources of information have informed their existing knowledge of LNG-EC (if any) before being assigned one of the three priming texts to read. This was done to control for the effect that prior knowledge of LNG-EC may have on how the participants are influenced by the priming texts.
The survey questions (apart from the demographics section and the prior knowledge section in the second experiment) were posed in the form of statements, with participants asked to respond using a five-point Likert scale that ranged from ‘strongly agree’ to ‘strongly disagree’. To avoid bias, the questions in the LNG-EC section were randomized.

The participants were asked about the mechanisms through which LNG-EC can prevent an unintended pregnancy, including preventing implantation, preventing ovulation, causing an embryo to dislodge from the uterus, and by impairing sperm transport through the reproductive tract. They were also asked if they would use LNG-EC, recommend it to their friends, if minors should have access to LNG-EC without parental permission, and if the medication should be available to all ages without a prescription.

To assess attitudes towards LNG-EC, participants were asked about a few commonly held prejudices about the medication; specifically, that it encourages promiscuity, an early sexual debut, and carelessness with regular contraception, as well as increasing the odds of contracting a sexually transmitted infection (STI) (Aneblom, Lundborg, Carlsten, Eurenius, & Tyden, 2004; Lawrence et al., 2010). It is important to note that there is no evidence to suggest that access to
LNG-EC has any significant effect on sexual behaviour (Moreau, Bajos, & Trussell, 2006; Moreau, Trussell, Michelot, & Bajos, 2009).

In both the pilot study and the experiment, the LNG-EC section of the survey was followed by the demographics questions. Participants were asked for their date of birth, nationality, race, gender, level of education, and religious denomination and attendance. The general demographic questions served two purposes: firstly, to determine if any of the participant's demographic influenced their answers the other questions; and secondly, to serve as a distraction before more personal questions about religion and sexual conservatism were asked. Previous research on this topic has indicated that gender and religiosity are significant factors when conducting a survey on attitudes towards the emergency contraceptive pill (Lawrence et al., 2010).

Participants in the pilot study were asked additional questions about their religiosity, but these were removed before the second experiment on the grounds that they were redundant. The religiosity and sexual conservatism questions have two purposes: firstly, to judge the background of the participants in terms of their general attitudes towards contraception and sexual intercourse for reasons other than procreation, and secondly to see if the priming statements encourage strong feelings for or against sexual conservatism. The answers given
by the two groups primed with information about the mechanism of action (groups T1 and T2) will be compared against the answers given by the control group (T3).

Previous research on the attitudes of doctors towards LNG-EC (Lawrence et al., 2010) found that doctors who answered that their religious faith was "the most important" were more likely to agree with statements that implied access to LNG-EC causes promiscuity and a younger sexual debut, while they were also less likely to agree with the statement that LNG-EC is effective at preventing pregnancy. This suggests that religiosity not only impacts on moral attitudes towards the drug but also affects how people perceive the usefulness of the drug as a medical intervention. This is why I included questions about the religious affiliations of the participants and how frequently they attend religious services.

The third and final section of the survey tool consisted of questions adapted from measures of sexual conservatism. The items were chosen to ascertain the attitudes of the respondents towards issues pertinent to LNG-EC, i.e. questions about contraception, abortion, and sexual behaviours. As in the LNG-EC section, the question order was randomized.
The questions in the sexual conservatism section largely stayed the same between the pilot study and the experiment, with the wording of some questions altered slightly to make the meaning clearer, based on feedback from the pilot. The purpose of this section was to allow us to determine the extent to which pre-existing attitudes about sexuality influence the attitudes of the participants as expressed in the survey towards LNG-EC.

Other studies have shown a seeming inconsistency between attitudes and practices from the perspective of the patient; for example, a study from Turkey found that while 92% of the participants claimed using LNG-EC was so immoral as to constitute a sin, over 20% had used the drug in the past nonetheless (Kisa et al., 2012). Holding an intensely negative view of LNG-EC by no means precludes use of the drug in the past.

The priming statement that implies that LNG-EC works by preventing implantation involves deception, because, as we saw in the literature review, no clinical study to date has shown convincing evidence for a post-ovulatory mechanism of action. However, this statement can be quoted verbatim from a variety of trusted sources, including the New Zealand Ministry of Health website ("Emergency Contraception,").
Likewise, the priming statement that there is no post-ovulatory effect can be taken from the International Federation of Gynaecologists and Obstetricians and the International Consortium on Emergency Contraception (International Federation of Gynaecologists and Obstetricians & International Consortium for Emergency Contraception, 2011), both of which are prestigious and respected organizations that have made numerous statements about the mechanism of action for LNG-EC. As such, it is possible to use both priming statements using language conventionally relayed to consumers.

Nonetheless, all participants were debriefed after the survey and told that there is no existing evidence that LNG-EC has a post-ovulatory mechanism of action to counteract any misconceptions that participants may have brought with them when beginning the survey and any that may have arisen from reading the priming statements and questions from the survey.  

---

7 If participation in this study caused a person in need of emergency contraception to forgo medical treatment – or caused them to encourage a friend or relative to forgo treatment - based on a misconception acquired during the study, this would constitute a real and serious harm to that person, regardless of whether or not an unwanted pregnancy resulted. Even if no unwanted pregnancy occurred, the loss of the peace of mind that LNG-EC could offer them would be unacceptable.
Recruitment Method.

The pilot study used convenience sampling of students at the University of Otago. The students were recruited through a number of means, most notably by posting flyers in common areas that the students have access to, and through emails sent out to the students from their respective departments. Students were instructed to email the researchers from their student email address for a link to the survey; after completion, they were asked to email the researchers again with the confirmation code they received at the end of the survey to make arrangements for receiving a gift card to thank them for participating in the project.

The experiment was conducted using the Amazon Mechanical Turk service; job listings were entered with the service. This allowed us to reach a North American audience quickly and with very little effort. Participants received 0.50 USD for participating in the project.

Selection Criteria.

The key criterion for selection of participants for the pilot study was current enrolment at the University of Otago at any level of study. While there was no
upper age limit on who could participate in this study, given the sensitive nature of the questions in the survey questionnaire, a minimum age of 18 years was necessary for inclusion.

For the experiment, the criteria for inclusion were current residency in either the USA or Canada, being at least 18 years of age, and being a Mechanical Turk worker at the time of the survey.

Limitations of the Recruitment Method and Criteria.

As the pilot study used convenience sampling, the participants were not representative of New Zealand as a whole. I decided that this approach is appropriate for a pilot study of limited scope. Based on the results from the pilot study, I decided to expand the scope of the project with the experiment. The Mechanical Turk platform allowed me to reach a more representative sample than the recruitment method used in the pilot study, but it still falls short of perfect representation of the population of North America.
Results and Discussion

Data Collection Period.

The pilot study was conducted online between the 9th of August and the 12th of September 2016. The experiment was conducted online between the 6th and 20th of October 2016. Running both the pilot and the experiment online made the data collection process easier and removed the need to manually input the data.

Data Analysis.

An initial pilot study was run to identify potential problems with the survey tool and priming texts. With only 81 participants, the group sizes in the pilot study were too small for any results to be statistically significant; however, the results from the pilot study and the comments from the participants were informative and helped to refine the primary survey tool. For example, the pilot study indicated that the participants were able to understand the content of the priming texts and answer questions based on that content.

Data were analysed using SPSS Statistics (version 22). As the data were ordinal, cross tabulations and Chi-Square statistics were used to compare between the groups. To compare the effects of the three priming texts, a series of non-parametric tests (Kruskal-Wallis and Mann-Whitney U) were performed. Results
were considered significant at \( p \leq 0.05 \). Where appropriate, Cramer’s \( V \) size effects have also been reported (\( \Phi_c \)).

The survey asked participants to indicate their affiliation with several major world religions. The majority of the participants (90.73\%) indicated either no religion (51.11\%, \( n=133 \)) or Christian religious affiliation (39.62\%, \( n=103 \)). The sizes of the groups of people who indicated affiliation with the other denominations were as follows: Buddhism \( n=5 \) (1.92\%), Hindu \( n=1 \) (0.38\%), Muslim \( n=2 \) (0.77\%), Jewish \( n=8 \) (3.08\%), and Other \( n=8 \) (3.08\%). Because of the negligible number of participants in anything other than the two most popular groups, data from the religious denomination question were combined into two groups for analysis: those who selected the “no religion” (\( n=133 \)) option and those who indicated affiliation with any of the other religious group (\( n=127 \)) options allowed in the survey.

Participants were also asked how frequently they attended religious services, if at all. The “not applicable” option was intended to separate non-religious participants from non-practicing religious participants, but only 9 of the 260 participants (3.46\%) used this option and 160 participants selected “never” (61.54\%). Although the “never”, “annually” (\( n=45 \)), and “weekly” (\( n=31 \)) groups were sufficiently large for multi-nominal regression analysis, the “monthly” (\( n=14 \), “more than twice per week” (\( n=1 \)) and “not applicable” (\( n=9 \)) groups were too small for analysis. The “annually”, “monthly”, “weekly”, and “more than twice per week” groups were therefore combined into a single “all attendance” group (\( n=91 \)); this allowed us to compare “all attendance” with the “never” attendance group. The “never”, “annually”, and “weekly” groups were compared
to examine how the level of religious attendance related to attitudes towards LNG-EC.

The survey asked four questions about the mechanisms of action through which LNG-EC could work to prevent a pregnancy. Participants were asked to indicate how strongly they agreed or disagreed with the following statements:

- The emergency contraceptive pill can prevent an embryo from implanting in the lining of the uterus.
- The emergency contraceptive pill can dislodge an embryo from the lining of the uterus.
- The emergency contraceptive pill works by preventing or delaying ovulation.
- The emergency contraceptive pill works by thickening cervical mucous.

Chi-Square, Mann-Whitney U, and Kruskal-Wallis tests were used to compare the answers given to these questions.

**Participants.**

There were fifty-seven respondents who started but did not complete the survey; these partially complete surveys were deleted. Additionally, thirty-four completed responses were rejected as invalid (having taken the survey twice, or filled in obviously erroneous demographic data, etc.) This left a total 260 valid responses from the experiment for analysis.
The participants in the second experiment (Table 1) were all active users of the online platform Mechanical Turk; as such, they may not perfectly represent all North Americans. However, the Amazon Mechanical Turk platform is frequently used in academic research and is a convenient and cost-effective method of recruiting participants (Buhrmester, Kwang, & Gosling, 2011).

The study population in the experiment had a relatively even distribution of gender. The majority (83.85%) of the participants were white and professed either no religion (51.11%) or else indicated they are Christian (39.62%).

When asked to indicate the highest level of education that they had completed (not the level at which they were currently studying), 1.15% indicated they had not completed high school (n=3), 10.38% were high-school graduates (n=27), 37.31% had attended “some college” but had not completed a degree (n=97), 41.15% held a bachelor’s degree (n=107), 8.46% held a master’s degree (n=22), and 1.54% had completed a doctorate (n=4).

Participants ranged in age from 19 to 79, with the mean age being 38.37 years. The majority of the participants were under the age of 40 (60.77%, n=158). Within the study population, use of LNG-EC was confined to participants aged 45 years or younger.⁸

Participants were asked to indicate their primary or most frequently used method of contraception by selecting one option from the list provided.

---

⁸This result was not surprising. Although the average for the onset of menopause in the USA is 51 years, studies of LNG-EC have frequently excluded participants outside of “reproductive age”, which frequently ends at 45 years of age or younger (for example: Biggs et al. (2012); Rahman et al. (2013)).
<table>
<thead>
<tr>
<th>Demographic Characteristics</th>
<th>Study Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>115</td>
</tr>
<tr>
<td>Female</td>
<td>142</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>19-29</td>
<td>47</td>
</tr>
<tr>
<td>30-39</td>
<td>111</td>
</tr>
<tr>
<td>40-49</td>
<td>67</td>
</tr>
<tr>
<td>50-59</td>
<td>26</td>
</tr>
<tr>
<td>60-69</td>
<td>7</td>
</tr>
<tr>
<td>70+</td>
<td>2</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>218</td>
</tr>
<tr>
<td>Black</td>
<td>26</td>
</tr>
<tr>
<td>Native American</td>
<td>4</td>
</tr>
<tr>
<td>Asian</td>
<td>11</td>
</tr>
<tr>
<td>Pacific Islander</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
</tr>
<tr>
<td>Less than High School</td>
<td>3</td>
</tr>
<tr>
<td>High School</td>
<td>27</td>
</tr>
<tr>
<td>Some College</td>
<td>97</td>
</tr>
<tr>
<td>Bachelor</td>
<td>107</td>
</tr>
<tr>
<td>Master</td>
<td>22</td>
</tr>
<tr>
<td>Doctorate</td>
<td>4</td>
</tr>
<tr>
<td><strong>Religion</strong></td>
<td></td>
</tr>
<tr>
<td>No Religion</td>
<td>133</td>
</tr>
<tr>
<td>Christian</td>
<td>103</td>
</tr>
<tr>
<td>Buddhist</td>
<td>5</td>
</tr>
<tr>
<td>Hindu</td>
<td>1</td>
</tr>
<tr>
<td>Muslim</td>
<td>2</td>
</tr>
<tr>
<td>Jewish</td>
<td>8</td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
</tr>
<tr>
<td><strong>Religious Attendance</strong></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>160</td>
</tr>
<tr>
<td>Annually</td>
<td>45</td>
</tr>
<tr>
<td>Monthly</td>
<td>14</td>
</tr>
<tr>
<td>Weekly</td>
<td>31</td>
</tr>
<tr>
<td>More Than Twice Per Week</td>
<td>1</td>
</tr>
<tr>
<td><strong>Prior Use</strong></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>40</td>
</tr>
<tr>
<td>No</td>
<td>218</td>
</tr>
<tr>
<td>I'd Rather Not Say</td>
<td>2</td>
</tr>
<tr>
<td><strong>Contraceptive Use</strong></td>
<td></td>
</tr>
<tr>
<td>Condoms</td>
<td>137</td>
</tr>
<tr>
<td>Oral Contraceptive Pills</td>
<td>63</td>
</tr>
<tr>
<td>IUD or Implant</td>
<td>18</td>
</tr>
<tr>
<td>Injection</td>
<td>3</td>
</tr>
<tr>
<td>Natural Family Planning</td>
<td>18</td>
</tr>
<tr>
<td>None</td>
<td>16</td>
</tr>
<tr>
<td>I'd Rather Not Say</td>
<td>4</td>
</tr>
</tbody>
</table>
**Text group assignment.**

There were no statistically significant differences in the distribution of demographic characteristics of the participants between the three “treatment” groups. This is to be expected as the participants were randomly assigned to the three priming text conditions (or “T groups.”) Therefore, any differences seen between the three T groups are likely to come from the priming texts and not from pre-existing differences within the groups.

Exposure to the priming texts did influence the participants in the study in terms of how they answered the mechanism of action (MOA) questions, but had minimal effect on how they answered the access to LNG-EC questions in the survey. Contrary to the initial hypothesis, T group assignment did not correlate with any statistically significant differences in attitudes towards LNG-EC in any of the four attitudes questions.

A Mann-Whitney U test between groups T1 and T2 did reveal some small but statistically significant differences on three out of the four access questions. There were no differences between any of the T-groups for the question “I would use LNG-EC if I needed it.” For the other three of the four access to LNG-EC questions (“friends” (p=0.02, φc=0.19), “minors” (p≤0.01, φc=0.24), and “available to all” (p≤0.01, φc=0.21)), there were small but statistically significant differences seen between T1 and T2, however there were no significant differences between T1 and T3 or between T2 and T3 (p>0.05).
Belief that LNG-EC prevents implantation was common in groups T2 and T3 (92.86% and 76.92%, respectively (p<0.001) and within the total study population (65.00%). T1 was the only group where the majority of participants did not agree or strongly agree (24.71%) with the statement implying that LNG-EC can interfere in uterine receptivity and implantation (p<0.001). It is worth remembering that T1 were explicitly told that LNG-EC could not prevent implantation, and yet nearly a quarter of that group still agreed with the statement that LNG-EC could prevent implantation.

No priming group had a majority of the participants indicating agreement with the statement that LNG-EC can cause an implanted embryo to dislodge, although groups T2 and T3 both had relatively high levels of support for this MOA (25.00% and 26.37% respectively) compared with the T1 group (7.06%) (p<0.001). No action involving implanted embryos was described in the priming texts received by any of the groups; this suggests that differences seen between groups T1-2 and T3 (the control group) are due to inferences made by the participants from the information in the different priming materials.

Agreement with the statement about LNG-EC preventing ovulation was very high in groups T1 and T2 (90.59% and 83.33%, respectively, p=0.001) but not in T3 (35.16%, p<0.001), which received no information about the potential mechanisms of action through which LNG-EC could work to prevent pregnancy. This is an interesting finding, as prior knowledge of LNG-EC was remarkably high across all three groups (89.29-95.56%), suggesting that the participants of all three groups would have been exposed to at least some information on how the medication works.
Product information for LNG-EC lists both the prevention of ovulation and the prevention of implantation as mechanisms through which LNG-EC works to prevent an unintended pregnancy. In the control group, T3, 47.25% of the participants disagreed or strongly disagreed with the statement that LNG-EC can work by preventing ovulation, compared to only 14.29% who disagreed or strongly disagreed with the statement that LNG-EC can prevent an embryo from implanting; this suggests that lay opinion on the MOA is being shaped by something other than the official product information.

Role of religion on attitudes towards LNG-EC.

Self-reported religiosity (denomination and frequency of religious service attendance) proved to be the strongest predictor of negative attitudes towards LNG-EC and the people who use the medication.

Increasing religiosity (more frequent religious service attendance) was negatively associated with support for access to LNG-EC (figures 1 to 4). That is to say, fewer of the participants in the weekly attendance group supported access to LNG-EC than in the annual attendance group, and fewer of the annual attendance group supported access to LNG-EC than the never attendance group.
When it comes to their own personal use, 88.9% of the ‘never’ attendance group either agreed or strongly agreed with the statement “I would use the emergency contraceptive pill”, as did 68.75% of the ‘all attendance’ group (p<0.001, $\phi_c=0.035$), 80.49% of the ‘annually’ attendance group (p=0.037, $\phi_c=0.15$), and 46.15% of the ‘weekly’ attendance group (p<0.001, $\phi_c=0.36$), (figure 1). For friends (i.e. members of the in-group) 85.00% of the ‘never’ group would
recommend LNG-EC compared to 61.54% of the ‘all attendance’ group (p<0.001, φc=0.33), 73.33% of the ‘annually’ group (p=0.031, φc=0.15), and 48.39% of the ‘weekly’ group (p<0.001, φc=0.32), (figure 2). However, minors would be denied access to LNG-EC by 28.13% of the ‘never’ group, compared to 53.85% of the ‘all attendance’ group (p<0.001, φc=0.31), 40.00% of the ‘annually’ group (p=0.031, φc=0.15), (figure 3).

![Minors Should Need Parental Permission to Use LNG-EC/Religious Attendance](image)

**Figure 3:** Support for minors’ access to LNG-EC vs. frequency of religious service attendance (%).

![LNG-EC Should Be Available to All/Religious Attendance](image)

**Figure 4:** Support for universal access to LNG-EC vs. frequency of religious attendance (%).
Further, 73.1% of the ‘never’ attendance group agree or strongly agree with the statement “the emergency contraceptive pill should be available to all ages without prescription”, compared to 51.65% of the ‘all attendance’ group (p<0.001, φc=0.28), 64.4% of the ‘annually’ group (p=0.078), and 45.2% of the ‘weekly’ attendance group (p<0.001, φc=0.26), (figure 4).

The same effect was seen with the attitudes towards LNG-EC questions (figures 5 through 8) where increasing frequency of religious service attendance was positively associated with negative attitude about LNG-EC and the people who use the medication. For example, 24.38% of the ‘never’ group agreed or strongly agreed with the statement “having to use LNG-EC shows you have been careless with your birth control”, compared to 44.44% of the ‘annually’ group (p<0.004, φc=0.199) and 45.16% of the ‘weekly’ group (p=0.003, φc=0.21), (figure 5).

<table>
<thead>
<tr>
<th>Using LNG-EC Shows You Have Been Careless/Religious Attendance</th>
</tr>
</thead>
</table>
| ![Table](image)

Figure 5: Agreement with stereotype that LNG-EC users are careless with their birth control vs. Frequency of religious service attendance (%).
Figure 6: Agreement with stereotype that access to LNG-EC encourages promiscuity vs. frequency of religious service attendance (%).

Additionally, although only 9.4% of the ‘never’ attendance group agrees or strongly agrees with the statement “The emergency contraceptive pill encourages promiscuity”, 13.3% of the ‘annually’ group (p=0.069) and 32.3% of the ‘weekly’ (p<0.001, φc=0.32) attendance groups agreed with that statement (figure 6).

Figure 7: Agreement with the stereotype that LNG-EC users are more likely to contract an STI vs. frequency of religious service attendance (%).
These are both interesting associations, as - when compared to the never attendance group - members of the ‘annually’ (p=0.186) and ‘weekly’ attendance (p=0.894) groups are not significantly less likely to report having used LNG-EC in the past.

As the participants were asked about prior use of LNG-EC, it is possible to see that the rate of LNG-EC use is similar across all attendance groups in spite of the pronounced bias against users expressed by the ‘annually’, ‘monthly’, and ‘weekly’ attendance groups. Indeed, the religious attendance groups are almost identical in regards to use of contraception. This is most apparent when looking at the ‘never’ and ‘all attendance’ groups: 55.4% vs. 49.5% use condoms, 22.6% vs. 24.2% use the oral contraceptive pill, 6.3% vs. 8.8% use IUDs or the hormonal implant, 1.3% vs. 1.1% use contraceptive injections, 6.9% vs. 7.7% use ‘natural’ family planning methods like the “rhythm” or “withdrawal” methods, and 5% vs. 8.8% use no form of contraception.
Discussion.

Contrary to the initial hypothesis, the priming materials did not have a significant effect on the participants’ attitudes towards LNG-EC or the people who use it. This was surprising; consistently, the potential for LNG-EC to harm an embryo or disrupt the implantation process is cited as the reason for moral objection to the availability and use of LNG-EC, e.g. (Anderson & Sullivan, 2013; Campbell, Busby, & Steyer, 2008; Cooper et al., 2008; Kahlenborn, Peck, & Severs, 2015; Lopez-del Burgo, Lopez-de Fez, Osorio, Guzmán, & de Irala, 2010; Lopez-del Burgo, Mikolajczyk, Osorio, Errasti, & de Irala, 2013; Peck, Rella, Tudela, Aznar, & Mozanega, 2016; Raviele, 2014; Spinnato, 1998; Sulmasy, 2006).

However, the priming materials did influence how the participants answered the questions on the mechanism through which LNG-EC works to prevent a pregnancy. In particular, the priming materials were effective at disabusing the majority of the participants in the T1 group (LNG-EC cannot prevent implantation) of the idea that LNG-EC can prevent the implantation process, although none of the three T groups disagreed completely with that statement.

Although the present study does not show how well this information is retained over time, it does reveal that the public is capable of understanding and applying relatively complicated information about reproductive physiology. These
findings are consistent with previous research that looked at how patients interact with LNG-EC product packaging (Aneblom, Larsson, von Essen, & Tydén, 2002; Raymond et al., 2009) and found that patients do read the product information and that they can understand that information.

Participants in groups T1 (LNG-EC can prevent ovulation but not implantation) and T2 (LNG-EC can prevent implantation and ovulation) were significantly more likely than the control group (T3) to agree or strongly agree that LNG-EC can prevent or delay ovulation. Groups T2 and T3 were significantly more likely than group T1 to agree or strongly agree that LNG-EC can prevent an embryo from successfully implanting in the uterus; if this alleged action of LNG-EC was the source of negative attitudes towards the medication, it would be logical to expect more agreement with the negative statements about LNG-EC in groups T2 and T3 compared to group T1. However, there were no statistically significant differences between the three T groups in terms of attitudes towards LNG-EC.

This is surprising, as Campbell et al. (2008) found that the beliefs about the mechanism through which LNG-EC prevents a pregnancy were an important factor for participants when deciding whether or not to use the medication. For example, a third of Campbell et al.’s participants indicated that they would use emergency contraception only if their doctor could assure them it did not cause
abortion whereas only 15% of that same sample would use the medication regardless of the mechanism. Similarly, Lopez-del Brugo et al. (2010) found that 45% of Spanish women would not use any form of birth control that works after fertilization.

If the strong negative attitudes towards LNG-EC were driven by a belief that the medication harms embryos (Campbell et al., 2008; J. D. Lewis & Sullivan, 2012; Lopez-del Burgo et al., 2010; Lopez-del Burgo et al., 2013; Spinnato, 1998), then it is logical to assume that being assured that LNG-EC cannot prevent implantation would mollify those holding those negative attitudes. LNG-EC would, logically, be no more objectionable than any of the other contraceptive methods the participants were asked about at the beginning of the experiment, such as IUDs and oral contraceptive pills, both of which can prevent implantation. Interestingly, pharmacists are significantly less likely to refuse to dispense oral contraceptive pills than they are LNG-EC (Davidson et al., 2010).

In the present study, religious affiliation and attendance were not correlated with support for any of the four mechanisms presented to the participants in the survey, meaning that the relationship between religion, attitudes towards, and access to LNG-EC is independent of beliefs about the mechanism through which LNG-EC acts to prevent a pregnancy after unprotected intercourse. This is at
odds with the research by Chung, Lawrence, Rasinski, Yoon, and Curlin (2012),
Lopez-del Brugo et al. (2010), and Lopez-del Brugo et al. (2013), all of which
found that religiosity was linked to beliefs about when pregnancy and life begin
and the acceptability of contraceptives based on whether they work before or
after fertilisation.

Similarly to Lopez-del Burgo et al. (2010); Lopez-del Burgo et al. (2013), I found
that religiosity was correlated with intention to use LNG-EC (a contraceptive that
is, mistakenly, thought to act through post-fertilisation mechanisms). However,
unlike these authors’ research, in the present study this intention was not linked
to beliefs about the mechanism. Instead, the correlation was independent of the
mechanism of action. Another difference between the current study and those of
Lopez-del Burgo and their colleagues is that I asked participants about their
actual use of LNG-EC, which allowed me to compare rates of use across religious
groups to see if they matched intentions. My findings suggest that the actual
behaviour of the participants in the studies conducted by Lopez-del Burgo might
not match their stated intentions. That is to say, that when at risk of an
unintended pregnancy, these objections to using what they believe to be a post-
fertilisation method may dissipate in favour of a more pragmatic attitude.
As religious people are more likely to believe that life and/or pregnancy begin at fertilisation (Chung et al., 2012; Lopez-del Burgo et al., 2010; Lopez-del Burgo et al., 2013), it would follow that post-fertilisation contraceptive methods would be more of a concern for them than for non-religious people. Indeed, Lawrence et al. (2010) found that highly religious physicians are less likely than non-religious or physicians to agree that LNG-EC is an effective medication, despite the fact that they are basing their opinions on the same clinical information about LNG-EC.

Similar to Lopez-del Burgo et al. (2010), in the present study stated intention to not use LNG-EC was correlated with religiosity. The research conducted by Lopez-del Burgo et al. (2010) with Spanish women found that 45% would not use a form of birth control that worked after fertilisation had already taken place, but they did not compare the intentions of the participants to actual behaviour. In my experiment, I did ask the participants about their prior use of LNG-EC, and so I was able to observe a discrepancy between stated intentions and prior use.

Across the different religious groups, there were no statistically significant differences in prior use of LNG-EC. However, there were significant differences in stated intention to use LNG-EC in the future if the need should arise. Specifically, more frequent attendance of religious services was a statistically significant
predictor of intention to not use LNG-EC in the future if the need should arise but not a significant predictor of actual use.

Unfortunately, it was not possible determine whether this discrepancy is due to an aversion to LNG-EC or due to a belief among these participants that they are unlikely to that need for LNG-EC in the future. However, use of all types of contraception was consistent across all demographics and religious groups (both in terms of denomination and frequency of religious service attendance), so there is little reason to believe that the groups with the lowest intention to use LNG-EC in the future are significantly less likely to experience an unintended and potentially unwanted pregnancy in the future. Furthermore, there is evidence to suggest that increasing religiosity does not correlate with a lower incidence of abortion (Adamczyk, 2009), which would suggest that religious people are not less likely than non-religious people to experience an unwanted pregnancy.

Many religions preach a pro-social message of tolerance towards those who do not share their values; for example, in the Christian religion, the parable of the Good Samaritan is used to teach followers to be tolerant and helpful to those who violate their tenets. However, religions also tend to encourage an intergroup bias in the form of in-group favouritism – and consequently, out-group derogation (Johnson, Rowatt, & LaBouff, 2012). Although this out-group derogation is most
notably directed at members of competing religious sects (Goplen & Plant, 2015), it can be argued that users of LNG-EC can also be viewed as an out-group because the use of LNG-EC is seen as violating a number of commonly held religious beliefs: the beliefs that sex is for procreation and not pleasure, that harming an embryo is murder (even though LNG-EC has no effect on embryos), and that premarital sex is a sin. As minors cannot be legally married, any sexual activity they engage in is, by definition, premarital sex.

The strongest evidence for an out-group derogation bias towards LNG-EC users is the linear relationship between level of religious attendance and negative attitudes towards LNG-EC users. As we saw in the results section earlier, increasing religiosity is correlated with a stronger bias against the out-group.

This is consistent with the findings of Lawrence et al. (2010), wherein increasing religiosity was positively associated with negative beliefs about users of LNG-EC. For example, only 5% of the OBGYNs surveyed by Lawrence et al. who indicated that religion was ‘not very important’ agreed that LNG-EC users were more likely to have a larger number of sexual partners than non-users, compared with 32% of OBGYNs who indicated that religion is the ‘most important thing’. Affiliation with a religious group alone is less strongly correlated with negative attitudes towards LNG-EC and users than religiosity; that is to say, it is the extent to which
the individual identifies with their religious group that controls the relationship, not denomination.

Sowden (2015) examined the effect of relational distance on moral reasoning, finding that the participants in his experiments judged the behaviour of strangers more harshly than they do the behaviour of people they have a close relationship with. This could explain why support for personal use of LNG-EC was more common amongst the three T groups and across all demographics than support for the use of LNG-EC for friends, minors, and the general public. The “friends” category of users includes members of the in-group who share a similar religious world view (Goplen & Plant, 2015), whose actions are interpreted with more sympathy than those of the out-group (Koval, Laham, Haslam, Bastian, & Whelan, 2011), but members of the “friends” group are still “not-self”, i.e. their “bad” behaviour is still a threat to the subject’s self-image.

The purpose of asking the participants about prior use of LNG-EC was to control for prior exposure to LNG-EC product information. However, by asking participants about their prior use of LNG-EC before the attitudes questions may have inadvertently primed some of the participants for ethical dissonance (Barkan, Ayal, Gino, & Ariely, 2012). Barkan et al. (2012) conducted a series of experiments in which participants were instructed to recall a past personal
transgression before asking them a series of questions about ethical dilemmas; the participants primed with memories of a past immoral behaviour judged other people more harshly than the participants who had been primed with memories of past accomplishments. This effect was named ‘ethical dissonance’ by the researchers conducting the project. Their theory is that recalling past misdeeds forces participants to engage in a double-distancing behaviour, wherein they both justify or minimise their own actions while magnifying the transgressions of others; this creates a clear mental boundary between the subject and the threat to their self-image as a moral person.

In the context of the present study, those participants who view using LNG-EC as a transgression could have been made uncomfortable by being asked to recall this behaviour. To alleviate this discomfort, they may have engaged in double-distancing behaviour, whereby their own use of LNG-EC was rationalised as an understandable human mistake but the use of LNG-EC by others was demonized as a sign of their irresponsibility and immorality (e.g., “I am not like those people.”)(Rothschild & Keefer, 2017). Barkan et al.’s work is consistent with that of Brandimarte, Acquisti, and Gino (2015)(2015); Brandimarte et al. discovered that participants asked to disclose unethical behaviour from their past, under experimental conditions, were more judgemental of and acted more harshly towards others who made similar disclosures of unethical behaviour.
Rothschild and Keefer (2017) showed in a series of experiments that participants will seek to diffuse guilt over moral transgressions by directing moral outrage at a third party if given an opportunity to do so. They found that merely being exposed to a third-party’s wrongdoing was not sufficient to assuage guilt; this exposure must be paired with an opportunity to express moral outrage before the damage to the moral self-image is repaired. By giving the participants in my experiment the option to make harsh judgements about others, I allowed those who view using LNG-EC as a transgression an opportunity to “cleanse” their moral self-image by directing moral outrage at some faceless “other”.

One interesting aspect of the ethical dissonance phenomenon is that it causes those affected by it to underreport their own “immoral” behaviour. Although highly speculative, if our more judgemental participants are engaging in double-distancing behaviour, it is possible that they actually use LNG-EC at higher rates than the participants who do not view using LNG-EC as a transgression, since in our experiment use of LNG-EC was self-reported as the same across all demographics.

There are two ways to test this hypothesis that participants are underreporting their actual use of LNG-EC. The first would be to replicate our experiment, but to randomize whether participants were presented with the prior use question
before or after the rest of the survey. However, a limitation of that method would be that participants affected by ethical dissonance would still be likely to underreport their use of LNG-EC. More accurate results might be obtained by tying the results of the survey to medical records; however, the stigma against the medication makes this impractical. Part of the appeal of being able to purchase LNG-EC without a prescription is being able to avoid an unnecessary appointment with a general practitioner. The stigma attached to needing and using LNG-EC encourages those in need to purchase the drug anonymously, making it difficult to track users of LNG-EC. A sexual health clinic could potentially be seen as a less judgemental environment in which to obtain LNG-EC than at the family doctor’s office or at the local pharmacy.

A local sexual health clinic may be the most appropriate location in which to enrol participants in a prospective cohort study to further examine the relationship between religious service attendance, attitudes towards LNG-EC, and actual use of the medication. The setting would allow participants to, hopefully, avoid at least some of the embarrassment associated with obtaining such a stigmatised medicine from a family doctor or the local pharmacist.
Limitations.

It would have been preferable to recruit a less homogenous study group; this would have allowed us to investigate what other demographic factors affect attitudes towards LNG-EC. As it is, our study group was disproportionately white and well-educated, and some or all of the effects seen in our experiment could be due to a yet unidentified confounding variable.

However, the method of recruitment allowed the experiment to be run with very little expense and in a relatively short period of time. As far as I am aware, this is the first experimental investigation into the effects of priming the lay-public with different mechanisms through which LNG-EC could act. As this experiment represents an initial exploratory attempt to address this important topic, it was appropriate to run the experiment quickly and inexpensively. The results of the experiment warrant further investigation of the effects seen.

Although the sample size was sufficient for the scope of this experiment, a larger sample size may have allowed a more nuanced analysis of the effect of religiosity on beliefs about the mechanism through which LNG-EC acts to prevent a pregnancy and attitudes towards the medication. My experiment did not reveal any significant correlation between frequencies of religious attendance and the different mechanisms in the survey, which is at odds with research that suggests
that religiosity is linked with beliefs about contraception and pregnancy. The current experiment was not able to adequately explore this inconsistency. A larger sample size would also facilitate a more thorough examination of the effect that prior use of LNG-EC has on the relationship between religiosity and attitudes towards LNG-EC.

The honesty of the participants is yet another serious concern. The sometimes quite intense stigma attached to the medication gives the participants ample reason to be less than forthright about their use of LNG-EC, which of course could obscure certain trends or patterns of use. However, because of the strength and prevalence of the stigma against this medication in all regions, it is fairly safe to assume that participants are not exaggerating their use of the medication. As such, it is unlikely that this study has over-estimated the prevalence of use.

As mentioned earlier, operating further studies of attitudes towards LNG-EC in sexual health clinics may help minimise the stigma felt by the participants. A limitation of that approach would be that attendees of sexual health clinics are a self-selecting group, which may not accurately represent the general population. There is also the added ethical concern of invading a domain – a sexual health clinic – wherein privacy and confidentiality are sacrosanct.
A final limitation of the study concerns the language used in the priming texts and survey tool. Originally, the word “blastocyst” was to be used in the priming materials, but was changed to “embryo” to avoid confusion for lay-participants. Although by some definitions the embryonic stage of human development does not begin until the 5th week after fertilization, the term “embryo” is frequently used in academic literature when discussing implantation (Boggavarapu et al., 2016; El-Danasouri et al., 2016; Fox et al., 2016; Macklon & Brosens, 2014). Critically, “embryo” is the word most commonly used by opponents of LNG-EC who hinge their arguments on the supposed potential of LNG-EC to prevent implantation (Kahlenborn, Stanford, & Larimore, 2002; Mikolajczyk, 2002; Mozzanega & Cosmi, 2011; Peck et al., 2016). Participants who have been exposed to these arguments in the past may see the use of “fertilised egg” in the place of “embryo” as disingenuous. If this experiment is replicated in the future, it may be worth exploring whether there is a significant difference in the effect seen when using the word “embryo” versus “blastocyst”, “fertilised egg”, or “zygote”.
Conclusion

Contrary to the initial hypothesis, being primed with language on implantation did not significantly influence participants in their attitudes towards LNG-EC.

The priming materials shown to the “cannot prevent implantation” group (T1) did slightly increase the percentage of participants who supported wider access to LNG-EC compared to the other two groups, but not to the extent that I had expected based on existing research into the topic. The strong association between religiosity and attitudes towards LNG-EC suggest that the priming materials were not sufficient to overcome pre-existing beliefs about LNG-EC.

Nonetheless, I believe that it is worthwhile to change the language used to describe LNG-EC to reflect our current understanding of the medication.


Croxatto, H. B., Brache, V., Pavez, M., Cochon, L., Forcelledo, M. L., Alvarez, F., . . . Salvatierra, A. M. (2004). Pituitary–ovarian function following the standard levonorgestrel emergency contraceptive dose or a single 0.75-mg dose given on the days preceding ovulation. *Contraception, 70*(6), 442-450. doi:https://doi.org/10.1016/j.contraception.2004.05.007


Appendix 1: The Survey

Attitudes Towards Levonorgestrel

Q1.1 Have you ever heard of the emergency contraceptive pill before this study?

☐ Yes (5)
☐ No (1)
☐ I’m not sure (3)

Q1.2 If you have heard of another form of emergency contraceptive please describe it here:

Q1.3 From which of these sources have you learned information about the emergency contraceptive pill?

☐ Media (0)
☐ Doctor/Other Medical Professional (0)
☐ Friends and/or Family (0)
☐ Sex Education at School (0)
☐ Unknown (0)
☐ None (6)

Q1.4 I have used the emergency contraceptive pill in the past:

☐ Yes (5)
☐ No (1)
☐ I’d rather not say (0)
Q1.5 If you have ever been sexually active, please indicate the method of contraception you have used most often:

- Condoms (0)
- Oral Contraceptive Pill (0)
- Intrauterine Device/IUD or Implant (0)
- Contraceptive Injection (Depo Provera etc.) (0)
- Rhythm Method or Withdrawal (0)
- None (0)
- I’d rather not say (0)

**Priming Text 1: LNG-EC prevents ovulation but not implantation**

Please read the following text very carefully, as you will be quizzed on your understanding of the material:

**What is the morning after pill?**

The morning after pill is a form of emergency birth control (AKA the emergency contraceptive pill) that can be taken after an episode of unprotected intercourse. In New Zealand, this pill is called Postinor and the active ingredient is levonorgestrel. It is most effective if taken within 24 hours of unprotected intercourse (95%), but can still be effective if taken within 120 hours after unprotected intercourse (58-85%).

It is important to realise that the morning after pill cannot protect you from STIs and is not suitable as a regular birth control method; if you find yourself in need of the morning after pill, it is recommended that you also visit your doctor at your earliest convenience for a sexual health check-up and to discuss your options for a more reliable form of birth control.

**How does the morning after pill work?**

The morning after pill can work by delaying or preventing the release of an egg from your ovary until after any sperm in the reproductive tract or no longer
active. Because of this effect, you may ovulate later in the month, meaning you will be at risk of becoming pregnant if you have another episode of unprotected intercourse.

A common misunderstanding is that the morning after pill changes the lining if the uterus so that an embryo cannot implant and become a pregnancy, but there is no clinical data that suggests this occurs. It is likely that the morning after pill acts solely by delaying or preventing ovulation; this means that if ovulation has already occurred, the morning after pill cannot prevent the fertilisation and implantation of an embryo.

**Where can I get the morning after pill?**

You can get the morning after pill at a low cost (or for free) from your doctor or the Family Planning Association. It is also available without prescription from most pharmacies.

**What are the side-effects?**

The most common side-effect is nausea; you can ask your doctor or pharmacist about medicine to prevent nausea. It is important to note that if you vomit within three hours of taking the morning after pill, you will need to take the pill again.

If you have a history of deep vein thrombosis, a blood-clotting disorder, or liver disease, you will need to ask your doctor if the morning after pill is safe for you to use.

This information is available on the Ministry of Health website.

しましょう I have read and understood the information above (1)

**Priming Text 2: LNG-EC prevents ovulation and implantation**

Please read the following text very carefully, as you will be quizzed on your understanding of the material:
What is the morning after pill?

The morning after pill is a form of emergency birth control (AKA the emergency contraceptive pill) that can be taken after an episode of unprotected intercourse. In New Zealand, this pill is called Postinor and the active ingredient is levonorgestrel. It is most effective if taken within 24 hours of unprotected intercourse (95%), but can still be effective if taken within 120 hours after unprotected intercourse (58-85%).

It is important to realise that the morning after pill cannot protect you from STIs and is not suitable as a regular birth control method; if you find yourself in need of the morning after pill, it is recommended that you also visit your doctor at your earliest convenience for a sexual health check-up and to discuss your options for a more reliable form of birth control.

How does the morning after pill work?

The morning after pill can work by delaying or preventing the release of an egg from your ovary until after any sperm in the reproductive tract are no longer viable. Because of this effect, you may ovulate later in the month, meaning you will be at risk of becoming pregnant if you have another episode of unprotected intercourse.

Another way that the morning after pill works is by changing the lining of your uterus so that an embryo cannot implant and become a stable pregnancy. If an embryo fails to implant, it will be expelled through the vagina with menstrual blood or mucous.

Where can I get the morning after pill?

You can get the morning after pill at a low cost (or for free) from your doctor or the Family Planning Association. It is also available without prescription from most pharmacies.
**What are the side-effects?**

The most common side-effect is nausea; you can ask your doctor or pharmacist about medicine to prevent nausea. It is important to note that if you vomit within three hours of taking the morning after pill, you will need to take the pill again.

If you have a history of deep vein thrombosis, a blood-clotting disorder, or liver disease, you will need to ask your doctor if the morning after pill is safe for you to use.

This information is available on the Ministry of Health website.

≥ I have read and understood the information above (1)

---

**Priming Text 3: No mechanism of action**

Please read the following text very carefully, as you will be quizzed on your understanding of the material:

**What is the morning after pill?**

The morning after pill is a form of emergency birth control (AKA the emergency contraceptive pill) that can be taken after an episode of unprotected intercourse. In New Zealand, this pill is called Postinor and the active ingredient is levonorgestrel. It is most effective if taken within 24 hours of unprotected intercourse (95%), but can still be effective if taken within 120 hours after unprotected intercourse (58-85%).

It is important to realise that the morning after pill cannot protect you from STIs and is not suitable as a regular birth control method; if you find yourself in need of the morning after pill, it is recommended that you also visit your doctor at your earliest convenience for a sexual health check-up and to discuss your options for a more reliable form of birth control.
Where can I get the morning after pill?

You can get the morning after pill at a low cost (or for free) from your doctor or the Family Planning Association. It is also available without prescription from most pharmacies.

What are the side-effects?

The most common side-effect is nausea; you can ask your doctor or pharmacist about medicine to prevent nausea. It is important to note that if you vomit within three hours of taking the morning after pill, you will need to take the pill again.

If you have a history of deep vein thrombosis, a blood-clotting disorder, or liver disease, you will need to ask your doctor if the morning after pill is safe for you to use.

This information is available on the Ministry of Health website.

I have read and understood the information above (1)
Q2.1 The following section will contain statements about contraception and sexual reproduction. Please read carefully and indicate the level of agreement that best matches your feelings for these statements.

Q2.2 The emergency contraceptive pill can prevent an embryo from implanting in the lining of the uterus.

- Strongly agree (1)
- Agree (2)
- Neither agree nor disagree (3)
- Disagree (4)
- Strongly disagree (5)

Q2.3 The emergency contraceptive pill can dislodge an embryo from the lining of the uterus.

- Strongly agree (1)
- Agree (2)
- Neither agree nor disagree (3)
- Disagree (4)
- Strongly disagree (5)
Q2.4 The emergency contraceptive pill works by preventing or delaying ovulation.

- Strongly agree (5)
- Agree (4)
- Neither agree nor disagree (3)
- Disagree (2)
- Strongly disagree (1)

Q2.3 The emergency contraceptive pill works by thickening cervical mucous to block the passage of sperm into the uterus and fallopian tubes.

- Strongly agree (0)
- Agree (0)
- Neither agree nor disagree (0)
- Disagree (0)
- Strongly disagree (0)

Q2.4 Having to use the emergency contraceptive pill shows that you have been careless with your birth control.

- Strongly agree (1)
- Agree (2)
- Neither agree nor disagree (3)
- Disagree (4)
- Strongly disagree (5)
Q2.5 I would use the emergency contraceptive pill if I needed it.

- Strongly agree (5)
- Agree (4)
- Neither agree nor disagree (3)
- Disagree (2)
- Strongly disagree (1)
- Not applicable (0)

Q2.6 I would encourage my friends to use the emergency contraceptive pill if they needed it.

- Strongly agree (5)
- Agree (4)
- Neither agree nor disagree (3)
- Disagree (2)
- Strongly disagree (1)

Q2.9 Under-aged minors should need permission from their parents to get the emergency contraceptive pill.

- Strongly agree (1)
- Agree (2)
- Neither agree nor disagree (3)
- Disagree (4)
- Strongly disagree (5)
Q2.8 The emergency contraceptive pill encourages promiscuity.

- Strongly agree (1)
- Agree (2)
- Neither agree nor disagree (3)
- Disagree (4)
- Strongly disagree (5)

Q2.9 People who use the emergency contraceptive pill are more likely to get an STI.

- Strongly agree (4)
- Agree (5)
- Neither agree nor disagree (7)
- Disagree (9)
- Strongly disagree (10)

Q2.10 The emergency contraceptive pill discourages people from using more reliable methods of birth control.

- Strongly agree (1)
- Agree (2)
- Neither agree nor disagree (3)
- Disagree (4)
- Strongly disagree (5)
Q2.11 The emergency contraceptive pill should be available to all ages without prescription.

- Strongly agree (5)
- Agree (4)
- Neither agree nor disagree (3)
- Disagree (2)
- Strongly disagree (1)

Q3.1 Please answer these demographic questions to the best of your ability given the options available.

Q3.2 What is your date of birth (day/month/year)?

Q3.3 What is your gender?

- Male (1)
- Female (2)
- Other (3)
Q3.4 Which ethnic group do you belong to? (Mark the answer or answers which apply to you)

☐ White (17)
☐ Black or African American (18)
☐ American Indian or Alaska Native (19)
☐ Asian (20)
☐ Native Hawaiian or Pacific Islander (21)
☐ Other (22)

Q3.5 If you answered "other" to the question above, please state which ethnic group you belong to:

Q3.6 What is your nationality/country of origin?

Q3.7 What is the highest level of education that you have completed?

☐ Less than high school (12)
☐ High school graduate (13)
☐ Some college (14)
☐ Bachelor (15)
☐ Master (16)
☐ Doctorate (18)

Q3.8 If you attended university, what was your area of study?
Q3.9 What is your religion?

- No religion (1)
- Christian (2)
- Buddhist (3)
- Hindu (4)
- Muslim (5)
- Jewish (6)
- Other (7)

Q3.10 I attend religious services

- Never (1)
- Annually (2)
- Monthly (3)
- Weekly (4)
- More than twice per week (5)
- Not applicable (6)

Q4.1 I consider the use of contraception to be a sin.

- Strongly agree (1)
- Agree (2)
- Neither agree nor disagree (3)
- Disagree (4)
- Strongly disagree (5)
Q4.2 Sex should be devoted to reproduction.

- Strongly agree (1)
- Agree (2)
- Neither agree nor disagree (3)
- Disagree (4)
- Strongly disagree (5)

Q4.3 Abortion should be made available whenever the pregnant person feels it would be the best decision.

- Strongly agree (5)
- Agree (4)
- Neither agree nor disagree (3)
- Disagree (2)
- Strongly disagree (1)

Q4.4 I disapprove of premarital sex.

- Strongly agree (1)
- Agree (2)
- Neither agree nor disagree (3)
- Disagree (4)
- Strongly disagree (5)
Q4.5 A person who contracts an STI is probably getting exactly what they deserve.

- Strongly agree (1)
- Agree (2)
- Neither agree nor disagree (3)
- Disagree (4)
- Strongly disagree (5)

Q4.6 Contraception should be readily available to under-aged minors.

- Strongly agree (5)
- Agree (4)
- Neither agree nor disagree (3)
- Disagree (2)
- Strongly disagree (1)

Q4.7 Young people are given too much information about sex.

- Strongly agree (1)
- Agree (2)
- Neither agree nor disagree (3)
- Disagree (4)
- Strongly disagree (5)
Q5.1 The purpose of this study has been to evaluate if the belief that the emergency contraceptive pill (AKA the "morning after pill") can prevent an embryo from implanting in the uterus effects what attitudes people hold towards the medication.

The International Federation of Gynecologists and Obstetricians and the International Consortium of Emergency Contraception has released a joint statement (which can be read in full here), and which has been summarized here:

- Inhibition or delay of ovulation is LNG ECPs principal and possibly only mechanism of action.
- Review of the evidence suggests that LNG ECPs cannot prevent implantation of a fertilized egg.
- LNG ECPs do not interrupt a pregnancy (by any definition of the beginning of pregnancy).
- LNG ECPs can prevent abortions by reducing unwanted pregnancies.

Q5.2 Do you have any comments or questions about the survey you have just completed and/or the emergency contraceptive pill?
Myths and Misconceptions

A Whistle-stop Tour of (Nearly) Everything You Didn’t Know You Didn’t Know About Sex and Reproduction

Emma Harcourt
# Table of Contents

**Myths and Misconceptions** ............................................................... 1

**Kia Ora** ........................................................................................................ 4

**The Nuts and Bolts** .................................................................................. 7
  Money-shot Misinformation ........................................................................... 7
  Problemas de Pene ....................................................................................... 16

**Not Your Mother’s Vagina Monologues** ............................................ 20
  How is Babby Formed? .............................................................................. 21
  Menstruation Mania ................................................................................... 30

**Let’s Get Physical** .................................................................................... 41
  Sexual Shenanigans .................................................................................... 41
  Erotic Orifice Injuries; or Things You Should Think Twice about Sticking in Your Anatomy ................................................................. 50
  Potions and Sexy Sorcery .......................................................................... 64

**Sexual Healing** ....................................................................................... 74
  To Conceive or Not Conceive ................................................................... 75
  Hey Doc, Can You Look At My Rash? ....................................................... 79

**And so to bed...** ...................................................................................... 82
Kia Ora

In the immortal words of Salt N Peppa, “Let’s talk about sex, baby.”

In the 21st century, information about sex and reproductive biology has never been more accessible. Wikipedia has 83 pages under the category of “sexology”, 46 under the category of “sex toys”, and 108 under the category of “paraphilias.”

Backdoor enthusiasts can enjoy 31 individual pages under the category of “anal eroticism”, including (but not limited to) “anal piercing”, “felching”, “figging”, “rusty trombone”, and “splash conception.”

But what good are 97 unique pages under the category of “sexual acts” if shame, fear, and puritanical prejudice keep you in (purely metaphorical and not at all kinky) shackles?! What use are 13 subcategories of “sexual health” when you aren’t 100% sure “how is babby formed?”

1 For those of you unfamiliar with the term and unable to Google the phenomenon right now, “splash conception” refers to a situation wherein semen leaks from the anus and into the vagina, resulting in a conception.

2 While we are on the subject, the Wikimedia commons image collection contains an astonishingly large number of free domain pictures of penises. Like, a troublingly large gallery of amateur penis photography. A “surplus to requirements” number of dick pics and money shots thoughtfully shared with the world, if you catch my drift. More dick pics than you’d accrue if you set up a thousand monkeys with a thousand Tinder profiles. A LOT OF DICK PICS WITH SEEMINGLY LITTLE OR NO PURPOSE is the point I’m trying to get across here.
With 7,477,069,771 people on earth (and counting), you can bet your buttons that (some) people are going at it like rabbits. Even if you, personally, are not getting frisky on a daily basis, _someone_ is – and chances are that they are one of the billions of sexually mature adults on the planet that have been deprived of a decent sexual education. Even among those of us lucky enough to enjoy “progressive”, fact-based sexual education classes, how useful was that education, really?

In my case, I certainly wasn’t going to ask the gorgon who tortured us in P.E. about the finer points of sexuality – and apparently neither were the four girls in my immediate circle of friends who got pregnant between the ages of 15 and 17. Sadistic gym teachers who make young, aspiring authors cry aside, can you honestly say there are no gaps in your sexual education? Are there no unexplored areas that could trip you up? Are there no burning questions that were left unspoken, rattling around in your fevered, teenage brain?

Of course there are unanswered questions and potentially troublesome gaps in your education! I do nothing but sexual health research all day and even I hadn’t heard of splash conception until just now! Those of you out there with paying jobs and grown-up responsibilities like children and/or mortgages must be riddled with conceptual holes!

When I was a little girl, my mother used to read me a story about how the sky fell down to earth and some of the pieces got lost; when we put it all back together, the stars are where we plugged the gaps with shiny things [1]. Let me plug your holes with shiny things.

---

3 Keep in mind; I was by no means a popular girl...
The Nuts and Bolts

There’s no special reason why penis and testicle-related myths go first in this text; it’s simply the order in which I pasted all the sections together (possibly after a few glasses of wine).

Anyway, here are some dick and ball myths.

Money-shot Misinformation

Myth: You can suppress ejaculation by pressing down on the perineum during orgasm.

You’re probably thinking “Wait, what? Is that a thing?!” and the answer is “yes.” Because people are weird.

I first came across the interesting manoeuvre described above while on a mission to research Chinese sex manuals; this led me on to the Taoist sexual practice of “conserving Jing” (in this case, sperm and semen) by pressing down on the base of the urethra during orgasm. The idea was that instead of leaving the body, the Jing would travel up the spine and “nourish” the brain – something that is very important if you believe that you will die if all your qi and Jing get used up.

---

4 Why was I researching medieval Chinese sex manuals? My grandparents were devout communists who made sure I grew up with a copy of A Barefoot Doctor’s Manual: The American Translation of the Official Chinese Paramedical Manual; based on this experience, I thought (correctly) that a wander through the Taoist school of medicine would bear fruit.
I have seen young men discussing the merits of this technique (sometimes referred to as a “dry orgasm”), either as a poor man’s contraceptive or as a way to control their sexual performance; with a little help from Google, you can find communities of men who speak openly about the pros and cons of this practice. Some of them have pictures of their face as their avatars. Pretty ballsy.

Whether or not you regard this as a myth depends on how you define success – do you consider this technique successful if no ejaculate leaves your urethra during orgasm, or do you define success as completely avoiding ejaculation altogether? If the former meets your expectations, then yes, this is successful if performed correctly (which is a big ‘if’) – you will have what is called a “dry orgasm”, where no dishonourable discharge immediately escapes. However, if you are counting on this technique to keep your swimmers in your sperm factory and your seminal slurry in the appropriate glands, then no, this technique will not stop an emission.

This distinction might be a little confusing, even with anatomy nerds. When you press on the perineum (the area between the testes and the anus, colloquially known as the “taint”) you can squish a section of the urethra shut; this stops seminal fluids from traveling out into the world – for a while, at least. This will achieve your purpose if you want to avoid having your baby batter spurting out at the moment of climax, but your spunk has already left its organs of origin, it’s just taking an alternative route.

So where does it all go then? That leads us on to the next myth...
Myths and Misconceptions

Emma Harcourt

Myth: Suppressing ejaculation allows your semen to travel up the spine and nourish your brain.

If not up the spinal cord to nourish the grey matter, whither does your spunk wander?

You might have noticed that erectoplasm can have quite a bit of inertia behind it when it exits the giggletick; Kinsey recorded one of his volunteers clearing the 8-foot mark (that’s nearly two and a half metres in proper measurements). With the urethra closed for business, traffic naturally diverts along the path of least resistance; in this case, through the prostate and urinary sphincter into the bladder. That sphincter is supposed to be a one-way street, and repeatedly forcing loads of ejaculate through from the wrong direction is an unkind thing to do to your plumbing just for the hell of it. You could theoretically weaken the sphincter that keeps the urinary floodgates closed while you find a socially acceptable place to pee.

Pressing down on your taint also puts you at risk of damaging your pudendal nerve, which is another way of ending up with a leaky faucet in your trousers. Most people are put off by the lingering odour of urine and tell-tale wet patches, so you might find your dating pool limited to water sports enthusiasts.

Pudendal nerve damage also causes “genital numbness” and pain that has been described by sufferers as “burning”, “stabbing”, and “knife-like”. Ouch. You can get this damage from activities as innocuous as bicycle riding or prolonged sitting, so deliberately poking yourself there might not be a great idea if you want to keep your ability to feel nice things in your genital area.
Myth: Nocturnal emissions are the work of demons.

There are two, totally legit theological arguments for why wet dreams are caused by demons. They both need a lot of back-story to make sense, so bear with me – I swear it’s worth it.

Waking up to sticky sheets and panties can be embarrassing to some people, but in 15th century Europe it was a little more serious than it is today. A papal bull published in 1484 informed the washed and unwashed alike that sleep orgasms were the work of demons known as incubi and succubi who came and had “unnatural” sexual intercourse with you in your sleep. Since nocturnal emissions are inherently demonic, you’d better not let anyone catch you cleaning up the evidence: church teaching would have you considered guilty of sodomy and witchcraft.

St Thomas Aquinas even got in on the action: he argued that, since Satan needed to take the form of a female demon to steal your sperm and a male demon to impregnate his lady friends, we had no reason to fear demon-spawn. You see, the devil is just a temporary surrogate involved in an early form of non-consensual artificial insemination, meaning the devil isn’t the bio daddy, just the fertility clinic tech that facilitated the process.

Another take on the “wet-dreams are the work of demons” thing is the idea that Lilith, the rebellious first wife of Adam, is stealing your man seeds.

If you’ve ever cracked open the Bible long enough to get through the first few chapters of Genesis (to those who haven’t, most of this happens on page one), you
might have noticed that there are two contradictory accounts of where women come from.

On the first day God turns the lights on, because working in the dark is a great way to fall down the stairs, and by the 6\textsuperscript{th} day he finally gets around to making people (after he gets through making the firmament and every living creature that moveth): “So God created man in his own image, in the image of God he created him; male and female he created them”. A bit repetitive I know, but basically men and women are created at the same time to have dominion over all the fishies, birdies, cattle, and creepy crawlies.

However, when you turn the page to Chapter Two, first God pats himself on the back for making a bloody good firmament and then takes Sunday off to sleep in; only then on the 8\textsuperscript{th} does he make the first human, Adam. It’s only after Adam gets through giving names to all the creatures in the world\textsuperscript{5} and gets lonely that God makes the first female by nicking one of Adam’s ribs while he’s having a nap.

By the Middle Ages people had built up quite a bit of dogma to explain why such a clunky and contradictory document as the Christian Bible totally makes sense and wasn’t cut and pasted together after a thousand-year-long game of Telephone. One of those explanations concerned the funny goings-on in Genesis.

The story goes that, instead of being a mistake, God did in fact make a man, Adam, and a woman, Lilith, on the same day but that he had to make Adam another wife after Lilith proved to be unsuitable. What made Lilith a subpar helpmeet for

\textsuperscript{5} Blue-footed Boobies, Adam? What are you, 12?
Adam? She wanted to take turns being on top during sex. No, really, that’s the reason. Lilith argued that because they were made from the same stuff at the same time that she and Adam should be equal partners in the whole dominion business and during sex too. Adam disagreed. God took Adam’s side. Lilith spoke the true name of God and became the world’s first super-villain.

Lilith’s blasphemy earned her immortality and other magical powers like being able to fly, so she fucked off out of Eden and took up with the Devil, going by the name Samael at the time, who turned out to be a much less selfish lover. Wanting gender equality in paradise is apparently a big no-no, so God decided to murder 100 of Lilith’s kids every morning and castrate her boyfriend so she couldn’t make any more; since she can fly and do magic, Lilith steals sperm from men foolish enough to sleep so she can try to replace her murdered babies as quickly as God smites them.6

So remember, the next time you have a wet dream, you have just been jacked off either by a vengeful she-demon or Satan himself.

**Myth: Semen is full of tiny people that get planted in the uterus like seeds in dirt.**

Aristotle gets quoted a lot as a great thinker, and his reputation as an intellectual powerhouse is why his views on human reproduction held sway until the 17th century. Unfortunately, he was dead wrong about a lot of shit.

Preformationism was originally put forward by Pythagoras (the algebra guy) but it was Aristotle that enthusiastically championed it, mainly because it really gelled with

---

6 This is all real religious scholarship, in case anyone was thinking I’m being sarcastic.
his existing theories about men and women – specifically that men are awesome and
women are awful. Aristotle claimed that women were just deformed and stunted
men (hence why we suck at everything) and that girl children are born when perfect
little man seeds are corrupted by awful, awful women and our wandering insanity
glands (i.e. uteri).

However, Aristotle liked to have things both ways, so while sperm contained tiny,
perfectly proportioned men, humans also didn’t really exist in solid form in utero for
the first 40 days (or 80 days for female foetuses). Before then, we existed as a
vaguely defined puddle or blob. At the magic 40 day mark (or 80, for us freaks of
nature with vaginas) *POOF* we underwent “ensoulment” and became tiny people.
As a theory, it lacks evidence and internal consistency, but that didn’t stop it being
THE explanation of sexual reproduction for nearly 2000 years. In fact, tiny sperm
men were one of the first things to be “observed” through the newly invented
microscope; Dutch microscopist Nicolaas Hartsoeker wrote *Essai de Dioptrique* in
1694 and included one of my favourite anatomical illustrations:
You’d think that the “two seed theory”, where men and women contributed equally to reproduction would make life better for us lady-type Pokémon, but you’d be wrong. The argument from the late 17th century onward went that because a man’s orgasm is necessary for impregnation, a female orgasm must be necessary too; from this we get Todd Akin’s famous “legitimate rape” idea, where pregnancy is now proof of consent or at least proof that the victim enjoyed the experience.7 Lovely.

**Myth: there are no sperm in pre-cum.**

Some people will tell you that the withdrawal method is a reliable form of birth control8 because they believe that pre-cum doesn’t contain sperm, or that if it does that the pre-cum has picked up old sperm from a prior ejaculation (in which case, it’s your fault if you end up pregnant). Many sexual health websites will tell you that all you need to do is flush your urethra by peeing in between ejaculations and you’ll be okie dokie. First of all, I know a girl who got pregnant at 17 because her boss told her that the withdrawal method is a sure-fire way to avoid getting in the family way but consistently “forgot” to pull out.9 Secondly, the claim that pre-cum is a sperm-free fluid isn’t as cut and dried as the “natural” family planning bunch would have you believe.

---

7 For those of you lucky enough to have avoided this story when it first took off, Todd Akin is an American politician who once staked his reputation on it being impossible to conceive during an act of rape because “if it’s a legitimate rape the female body has ways to try to shut that whole thing down.”

8 Lol.

9 If there is a god, this man will burn for eternity in the flaming pits of hell.
While studies of the sperm count of pre-ejaculate fluid are pretty thin on the ground, the two most recent ones (published in 2011 and 2016) are pretty rigorous and both have found that a significant percentage of people produce pre-cum with viable sperm capable of fertilizing an ovum [2, 3]. The lowest estimate comes from a Thai study conducted in 2016, which found that 17% of their “healthy males” produced viable sperm in their pre-cum, while a 2011 study found even higher rates, with 37% of their participants leaking active swimmers in the lead-up to climax. With those odds, you are basically playing Russian roulette with your uterus.

In the 2011 study, all the participants abstained from hanky-panky for at least 24 hours before depositing their specimen – some of them managed to keep their hands to themselves for several days at a time - so you can’t say they were just picking up stragglers that hadn’t been flushed away yet. Add to this the number of people who “forget” to pull out and you can see why I think the withdrawal method is a pretty shitty way of keeping your uterus untenanted.

Once an embryo takes up residence, it can be quite difficult to evict them, especially since a lot of countries afford them squatter’s rights, even though they don’t necessarily extend the same consideration to homeless people.

If someone tries to tell you “it’s OK, I’ll pull out!” tell him or her to suit up or shove off. Or, as a safe-sex PSA aired in my country a few years ago said: “if you don’t got the rubba there’ll be no hubba hubba.”

---

10 Who says the government is painfully out of touch with the young?
Problemas de Pene

Myth?: The Incredible Shrinking Genitals

Koro, also known as "shrinking penis", is a real diagnosis found in the Diagnostic and Statistical Manual of Mental Disorders IV–TR; sufferers of koro become absolutely convinced that their genitals are not only shrinking, but are in serious danger of disappearing altogether, like a turtle retreating into its shell [4, 5]. It appears to mostly be a penis-specific disorder, although it’s theoretically possible someone could develop an intense fear of his or her already internal reproductive organs migrating further inland, as it were. It’s also what is known as a culture-bound syndrome, in that it occurs mainly in Southeast Asia.

Koro anxiety attacks can be triggered by temporary shrinkage (like that caused by swimming in a cold pool), but generally the disorder is associated with purely imaginary changes to the genitals. I can only imagine the emotional chaos that penis-enhancement spam emails would cause the koro-afflicted...

There are some real, physical conditions that could be causing your genitals to shrink. Peyronie’s disease is a disorder where the connective tissue in your penis becomes inflamed; it can cause your penis to bend in a weird way, stop you from getting full erections, and even shorten your penis. It’s estimated that Peyronie’s disease affects about 5% of penis-owners, and there are some medications and surgical procedures that can help.
Another condition that can give the illusion of a shrinking penis is buried penis, where fat in the pubic area envelops your member. The usual treatment is a weight-loss programme, but since weight-loss is a slow and stressful course of action, it is possible to have some of the suprapubic fat surgical removed to free your willy. It’s not hard to see how getting your missing genitals back could boost your self-esteem.

If you think your genitals are retreating into your body, you should see your doctor. Either you’re imagining it, in which case you will need professional help, or your genitals really are shrinking, in which case you will need even more professional help.

**Myth: Shenkui – or near-fatal yang deficiency**

Earlier we covered a Taoist technique that was meant to “conserve jing”, but we didn’t really cover the consequences of failing to conserve your life force (baby batter). Well, shenkui is what happens if you lose too much yang via ejaculation [5].

Symptoms include:

- Dizziness
- Fatigue
- Insomnia
- Backache
- Dreams
- Premature ejaculation
- Impotence
- Death
Like koro, shenkui is a culture-bound syndrome, occurring only in China. It’s also another condition that has no discernable physical cause; unlike koro, there is no surgical option, so shenkui is usually treated as a form of anxiety.

**Myth: An erection is a sign of consent.**

Some people – awful, awful people – believe that it is impossible for a man to be raped. Surely, they say, an erection is proof that they liked it? Well, this is as obnoxious as saying that a woman wasn’t really raped if her vagina produced lubrication during her assault or – heaven forbid – her reproductive tract produced an orgasm or – even worse – her ovary spits out a viable ovum ready to be fertilized by rapist sperm; which, of course, are more things that these awful, awful people do say.

Do you know how farmers get sperm for artificial insemination? They use an electric probe to “milk” the prostate and cause an ejaculation. The male animals undergoing this procedure don’t have to be aroused for it to work; in fact they don’t even have to be conscious and are often under general anaesthesia during the electroejaculation.\(^{11}\) It’s a basic, involuntary response to certain stimuli. We even use the procedure on people with spinal cord injuries that prevent them from being able to produce a sperm sample the old-fashioned way.\(^ {12}\) Orgasms are a reflex response

\(^{11}\) Incidentally, it isn’t just farm animals and people with spinal cord injuries that are getting their prostates zapped with electricity; a sizeable community of consenting adults submit to the electrified anal probe willingly with much satisfaction had by all. The equipment is an expensive investment but the reviews are glowing. We will revisit electrical stimulation (also called E-stim) later in this text.

\(^{12}\) A Song of Ice and Fire Spoiler Alert: apparently the book doesn’t say, but if Theon Greyjoy is still in possession of his balls after Ramsey Bolton was finished surgically altering Theon’s genitals, then he
from the autonomic nervous system, meaning that pleasurable stimuli create impulses that travel to the spinal cord and back again to cause enjoyable muscle spasms; an intact electrical connection to the brain isn’t necessary.

N.B.: My supervisor wanted me to make extra sure that electrical stimulation of the prostate could provoke an erection. Several YouTube animal husbandry videos later, I was more than satisfied that, yes, getting ye olde electrified anal probe applied to thine prostate would, indeed, induce a stellar stiffy. To be doubly safe, I also tracked down several stuffy peer-reviewed articles to back this up [6-9]. But, please, appreciate for a moment that I had a 100% legitimate reason to use my university’s internet to watch what could be considered bestiality porn - in the middle of the day, while sharing the highlights with my poor officemates, who were trying to work.

could theoretically still produce an heir for the Iron Islands; all he needs is a fertile wife, someone with long fingers, and the faux-medieval equivalent of a turkey baster.
Not Your Mother’s Vagina Monologues

Now that we’ve got the penis material out of the way, we can move onto the really interesting stuff: conception through oral and anal sex, tampon-sniffing bears, and human women giving birth to rabbits. We also take a lengthy detour down the road of menstrual mania, in which those who do not menstruate have plenty of strong opinions about how those of us who do are:

A. Crazy
B. Evil
C. Witches
D. All of the above

If you’ve made it through my gratuitous use of puns and euphemisms in the male reproductive anatomy section, I probably don’t need to warn you that we are going to explore some squiggly bits in graphic detail. And yes, there will be blood.
How is Babby Formed?

**Myth: You can get pregnant from oral sex.**

This is a surprisingly common myth – one I can remember from my own time at high school (although in that case it also involved inter-species conception). I’ve found references to this myth all over the place, but let’s look at one specific example from an online agony aunt site called Go Ask Alice:

“Dear Alice,

I heard this from my sex Ed teacher in high school, and I was wondering if he was correct. Can a girl get pregnant from having semen in her mouth? He said that if there are cuts inside her mouth, the sperm can get into the bloodstream and possibly get the girl pregnant.”

First of all, I weep for the state of education. Secondly, if you swallow after oral sex, all that’s going to happen is that the little swimmers are going to get dissolved in the gastric juices in your tum-tum. Seriously, you produce hydrochloric acid in there – those sea-monkeys are going to get napalmed almost instantly. There is no direct route from your mouth to your vagina (unless you are flexible enough for auto-cunnilingus, which I’m almost certain is impossible).

Sperm are far, far too large to be absorbed into your blood stream, so it doesn’t matter if there are cuts in your mouth. Even if sperm could enter your blood stream, there isn’t any way that they would somehow magically end up in your Fallopian tube afterwards.
A teenager can be forgiven for being led astray by a trusted adult in a situation like this, although it is appalling that a teacher was spreading this kind of nonsense around in the first place. Hopefully this incident represents a misguided attempt at the “scared straight” approach to brainwashing teaching and is not a sign that any dunderhead can get a teaching degree.

Unfortunately, this teen and their severely under-qualified teacher aren’t alone in believing such balderdash. In 2015, a lawmaker from Ohio suggested that women could receive gynaecological exams remotely by swallowing tiny endoscopic cameras [10]. Those of you who enjoy the mortification of the flesh can look up the video of a doctor painstakingly walking this Republican through the reasons why a medical device entering the body through the mouth really, really shouldn’t end up in the vagina at any point unless something is terribly wrong. Keep in mind that this is an elected official who has the power to create laws and regulations that can help or hinder your ability to receive medical care.

That being said, and because fact is stranger than fiction, I do have to tell you that I have come across some evidence that at least one person in human history has gotten pregnant from a blow-job – it just wouldn’t be ethical of me to not share this utterly bizarre story with you. Bear with me for a minute and all will be made clear.

Deep within the archives of the British Journal of Obstetrics and Gynaecology, there exists a case study – written in 1988 by a real doctor and published by a real, peer-reviewed scientific journal – about a teenage girl who got pregnant from

---

swallowing after making her significant other a very happy man [11]. According to Dr DA Verkuyl, this 15-year-old girl in Lesotho managed to get pregnant from oral sex.

He writes that the girl, working as a barmaid at the time, had just finished administering carnal affection to her current lover when her former lover arrived on the scene, brandishing a knife. The end result of this interaction was that our young heroine ended up in a local hospital having two serious stab wounds in her abdomen repaired. At least one of these stab wounds penetrated the wall of her stomach, which meant that the medical professionals working to keep her alive had to flush her abdominal cavity with saline to prevent an infection from any stomach contents that might have leaked out. Roughly nine months later, this young lady was delivered of a healthy baby boy via caesarean section. Dr Verkuyl, working in a time before DNA tests, assures us that the bouncing baby miracle strongly resembles the fellatio recipient from the previous paragraph.

Now, Emma, how can we know she didn’t find time for some vaginal hanky-panky in her busy knife-fight schedule? That, dear reader, is an excellent question and you are a remarkably astute individual for asking it. The answer is: she didn’t have one. A vagina – she didn’t have a vagina, is what I mean.

As well as having an active love life full of romance, physical intimacy, and near-lethal violence, our young protagonist also had a rare anatomical anomaly. Dr Verkuyl explains at length that all other parts of her external genitalia were complete and in the traditional positions, but there was no connection between her functioning uterus and the outside world.
Since the article was first published in 1988, many people have wondered if it’s a hoax – an elaborate joke never meant to be taken seriously. The only people who can ever really know the answer to that are the staff at the *British Journal of Obstetrics and Gynaecology* (which is a real, respectable journal), Dr Verkuyl (who is a real doctor with real research under their belt), and a Mosotho\(^{14}\) woman who would now be in her 40s (if she exists.)

**On a related note:**

If we are going to strain credulity and entertain implausible (but not impossible), New Jersey urologist Brian Steixner, of Atlantic City, is willing to stake his reputation on a report of a woman conceiving during anal sex (similar to the splash conception phenomenon you might remember from the introduction at the beginning of this text)[12]. However, like our teen from Lesotho with the soap-opera love life, this story also involves a very rare genital “quirk.” According to Dr Steixner, he had a rare (1 in 25,000) chance to run across a young woman born with a cloaca; this is when little biologically female infants come into the world with one all-purpose hole (a cloaca) instead of three separate ones (urethra, vagina, rectum). She had a surgical repair at birth, which should have been a permanent fix, but, according to Dr Steixner, this was not so.

The first indication that something was amiss came when our anonymous lass presented with a not uncommon complication of pregnancy: spotting. That’s when pregnant people get very light bleeds from their vagina during pregnancy. It’s

\(^{14}\) Fun fact: this is (according to Google) the correct way to refer to a person from Lesotho.
normally no big deal, but something your doctor should check out just in case it is an early sign of a more serious condition like placenta previa. What isn’t normal is to get spotting through your anus. That’s what Dr Steixner was presented with: a young woman presenting with a normal and (in this case) harmless light bleed during pregnancy...from her anus...

After her back-passage was formally identified as the source of the rust stains on her knickers, Anonie Miss revealed a rather spectacular secret to the good doctor: she’d been having anal sex exclusively in the period in which she conceived.

Our lady of the multi-purpose orifice delivered a healthy infant via caesarean, her vaginal canal being written off as a dead end.

**Myth: You can get pregnant with a non-human animal.**

When I was about 14 or 15, a rumour swept through my high school that so-and-so got pregnant because she accidentally swallowed the sperm of a sea-creature while out swimming; the accounts differed as to what kind of sea-creature she was currently gestating (either a shark, whale, or octopus), but that hardly mattered when there was such fantastic and implausible gossip to spread around.

Xenotransplantation – the long, sciency word for when we Jerry-rig bits of animals to fix broken bits of ourselves (like getting a pig heart valve because there aren’t any people valves in stock) – has been around since Serge Voronoff started grafting monkey glands into the wealthy but impotent in 1917. Although Vornoff’s monkey testicle treatment was an abysmal but lucrative failure, we have since made great
Myths and Misconceptions

Emma Harcourt

strides in incorporating bits of non-human animals into our anatomy. So much so that the question of interspecies pregnancies has come up again.

Again?

The idea that we might be able to harbour non-human embryos (interspecific pregnancies) or even create animal-human genetic hybrids through interspecies mating has captured the human imagination since the Palaeolithic era. After all, where do you think centaurs, minotaurs, harpies, mermaids, and various other fantastic abominations come from? Even Lilith, who we met earlier, is sometimes depicted as being part bird with vicious talons to disembowel people.

Advances in cloning and artificial reproductive technology have led us to the point when we need to seriously consider a future in which interspecies surrogacy could be a real possibility. We could use the technology to bring critically endangered species back from the brink of extinction or revive long-lost creatures like mammoths and moa. We could use animal wombs to incubate human foetuses instead of putting human beings through the dangerous experience of bringing a pregnancy to term.

Exciting and ethically complex biotech aside, the idea that you can impregnate or be impregnated by a non-human animal is a persistent one.

The Hebrew Bible instructs us that, in cases of interspecies intercourse, both the animal and the human should be executed; by the middle ages, this had become secular law. For example, in 1539 a man called Guillaume Garnier was charged and convicted of sodomizing a female dog; both he and the dog were put to death, and
the trial records were burned for being “too horrible and potentially dangerous to be permitted to exist.” About a century later, one of the first Europeans to be executed at the Plymouth colony was a teenage boy named Thomas Granger, who was convicted of sexually assaulting “a mare, a cow, two goats, divers sheepe, two calves, and a turkey”. Again, none of the animals involved were permitted to live.

My favourite historic account of interspecific pregnancy is that of Mary Toft, Mother of Rabbits, and First of Her Name [13-15].

In the early 18th century, an English woman became a minor celebrity for a very strange reason: she was giving birth to rabbits. Her amazing obstetric stunts gained the attention and support of important physicians, at least one of whom (John Howard) saw her as proof about his pet theory: that pregnant people could develop obsessions that would alter the anatomy of their foetuses in utero.

Of course, she wasn’t actually gestating bunnies. What she was really doing was almost equally incredible: she was sticking rabbits up herself and “birthing” them for a paying audience. She didn’t do it once or twice; she’s reported to have performed the same feat dozens of times in front of celebrated doctors who examined her and declared her the genuine article. She was even dubbed the real thing by the king’s personal surgeon, Nathaniel St. Andre.

Her husband was making a mint off this bizarre behaviour, but I doubt her own motives were purely pecuniary. The first bunny birth followed immediately after a fairly late term miscarriage; while her cervix was still dilated, she forced a newborn rabbit into her uterus and “gave birth” to it later that day. To this armchair
psychologist, that smacks more of post-partum psychosis than calculated moneymaking scheme. (Unfortunately, whether the rabbit was alive or already dead when it became intimately acquainted with her anatomy is lost to time).

Another clue that this was (at least at first) disorganized behaviour was the fact that Ma Toft wasn’t particular about which kinds of small mammals she was introducing to her internal cavities; when baby bunnies weren’t available she would resort to using pieces of larger animals, including bits of cats. That’s not a very smart move if you are attempting to pull off a long con, but makes a lot of sense if you are driven by a genuine compulsion.

The other members of her family were much smoother operators. Mr Toft was buying up more rabbit carcasses than he and his wife could possibly be eating and her sister-in-law was sneaking them into the delivery room before the audience arrived. Problems arose when Mary’s antics caught the attention of King George I, who had her brought forcibly to London and ordered her to be kept under guard until she managed to produce another rabbit. A servant was caught sneaking a rabbit into her room, sent by Mary’s sister-in-law; the excuse that she just wanted to send Mary some dinner wore a bit thin, especially after Mr Toft’s shopping habits were discovered.

Mary served a short prison sentence for her part in the “hoax”, which I think was uncalled for. Then again, given the time period, they just as easily could have executed her for being a witch, so maybe she got off easy. Either way, she lived to a ripe old age, so her shenanigans can’t have done too much damage to her. Personally I can’t help but wonder what kind of infections she got from putting small
creatures where they did not belong; I would think thrush would be the least of her worries.

Hogarth's *Cunicularii, or The Wise Men of Godliman in Consultation* (1726)
Menstruation Mania

Myth: Bears are attracted to the smell of menstruation.

In 1967, Glacier National Park saw its first and second bear attacks both on the same night. On the 13th of August, two hikers, camped at sites 14 kilometres apart, were both fatally mauled by grizzly bears in the small hours of the morning. When a reporter asked a park ranger what could have brought the attacks on, the ranger replied, "Oh, they must've been having their periods."[16] The following day, the story that two women brought about their deaths by menstruating while camping was headline news across America.

Interestingly, the ranger decided not to mention that Glacier National Park left food near campsites to deliberately attract bears for the tourists to photograph. No, in this seasoned professional’s mind, deliberately baiting wild animals with literal bait wasn’t what caused the double tragedy on that late summer’s night in 1967; it was the curse of womanhood that bewitched the creatures into attacking.

On a lighter note, those of you who have seen the movie Anchorman may already be familiar with this theory: in a scene where the main characters discuss the potential dangers associated with hiring a female newsreader, one proffers a handy piece of information:

“I read somewhere their periods attract bears. Bears can smell the menstruation.”

I didn’t think that there would be an actual study that I could cite to go with my favourite Will Ferrell movie, but once again the goddess of academia has been generous in her blessings.

In 1991, in order to address concerns the bear attacks at Glacier had been fuelled by the carnivorous animals’ endometrial blood-lust, Lynn Rogers and her colleagues with the US Forest Service arranged a series of strange encounters between bears and used tampons [17].

It’s important to note here that the researchers used black bears in their experiments instead of the more deadly grizzlies that caused mayhem at Glacier. If they had they may have been torn to shreds and we would still be in the dark about the bear-attracting properties of menstrual blood.

In the first of a series of bizarre experiments, tampons soaked with genuine human period blood from genuine human vaginas were attached to fishing lines by Rogers and friends, and then cast at groups of black bears. In 20 out of the 22 bear-fishing expeditions, the black bears completely ignored the feminine hygiene products. In the other two cases the bears paused briefly to check out the tampons before turning back to the delicious garbage they were enjoying.

Rogers’ next experiment involved trying to tempt the bears with tampons up close, after first luring the bears with the promise of free corn. However, even when hand-delivered, the black bears didn’t give a damn about the bloody tampons; one yearling did tentatively nibble on one of the tampons, only to decide almost immediately that it preferred the corn.
Personally, I would have been reasonably satisfied with these results, but not Rogers et al.: they were determined to press on.

The third experiment was the strangest yet; it included presenting black bears with an array of tampons in used, unused, imitation used (i.e. soaked with non-period blood) and “rendered beef-fat” flavours. The beef-fat tampons were the clear favourites, as none of the other tampons were deemed edible, even to creatures that consider garbage a delicacy.

Throwing caution to the wind, the next two experiments involved sending live human women in the midst of the red tide to hand-feed the bears, creating an even more dangerous situation than even the original bear attacks that inspired the brouhaha in the first place.

This bloody determination to tempt fate might explain why the researchers chose to study a less dangerous species of bear. All the same, the real mystery here is how Rogers and company wrangled ethical approval for their elaborate suicide mission.

The female participant was asked to hand-feed the wild animals to encourage them to get up close and personal with her anatomy. After lengthy observation during which none of the bears exhibited “any sniffing at lower torsos”, the hypothesis that black bears are drawn to menstrual blood was finally abandoned. Thank god.

However, before you set out to live in harmony with the bears (and generate some A-grade bear-mauling footage), I have to point out that while black bears may
not be menstrual connoisseurs, polar bears are apparently more discerning in their tastes.

In 1983, Bruce Cushing of the University of Montana found that polar bears were more partial to used tampons than they were to unused tampons and cheap imitation tampons soaked with non-period blood, a distinction not made by the black bears when making their dining choices [18]. Cushing’s experiment was a much less elaborate affair, with different flavours of tampon left on the ice to see (from a distance) what the polar bears would make of them. Seal oil and blubber were used as a control and the non-menstrual blood came from the same women who donated the used hygienic devices to the research effort.

The bears were more inclined to eat the real used tampons than the unused and imitation used tampons, but nothing really compared to the seal treats; the bears were able to pinpoint the seal blubber with laser-like precision every time.¹⁵

While we technically still don’t know how grizzlies feel about tampons, the consensus among park rangers is that it’s fairly safe to go camping while Aunt Flo is visiting. Just make sure your campsite isn’t being used as a giant bear lure and that you leave your seal blubber at home.

Myth: You can’t get pregnant during your period

The truth is that your period isn’t necessarily a “safe” time to have contraceptive-free sex if you want to avoid a pregnancy. That isn’t to say that the odds are

¹⁵ A colleague of mine spent some time in Antarctica recently, and he cannot stress enough how bad seal blubber smells.
particularly high of conceiving while menstruating, just that it isn’t impossible either (despite what the rhythm method people would have you believe.)

If every person’s cycle was as simple as the one described to me by my school nurse, then there would be 3-5 days of light bleeding (“about a teaspoon full of blood” according to Nurse Pantson McFire) every four weeks like clockwork, with ovulation happening on the 14th day – long after the bleeding has stopped. But biology is weird and wonderful so I’ve never met a person with such a regular and trouble-free cycle; for example, my own cycle is 42 days long on average, but ranges between as short as 18 days and as long as 53.

To explain how you can get pregnant on your period, let’s look at my record for shortest menstrual cycle: the bleeding lasted for 4 days and my next period started 18 days after the last began, meaning I probably ovulated on the 4th day; as sperm can survive in the uterus and fallopian tubes for as long as 5 days, if I had sex during or immediately before my period, then I would have had viable sperm ready and in position when the egg was released.

**Myth: You ovulate on the 14th day of your cycle**

Every person’s cycle is different and very few people have the “textbook” cycle of 28 days (which was settled on as the “ideal” cycle by someone who had never menstruated in their life, by the way). If you did have a miraculous regular 28-day cycle, then you would usually ovulate on or near the 14th day. But hardly anyone has a cycle like that.
Even if you do have the magical 28-day cycle, all sorts of things can stretch out or shorten your menstrual timeline. Illness and stress can both shorten or lengthen cycles, as can hormonal birth control options like oral contraceptive pills (including the emergency contraceptive pill) and IUDs. All of this means that you can’t really predict when you will ovulate just by counting forward from your last period; although, because the process after ovulation does take about 14 days, you can count backwards from your period to make a fairly educated guess about when you ovulated in the past.

The calendar method of reckoning just isn’t reliable, which is why people tracking their fertility at home get super technical about it; charting bleeding patterns, mucous thickness and colour, basal temperature, and even testing their pee twice a day for luteinising hormone (which signals ovulation). In clinical research, they pick people with cycles as punctual as the Japanese rail system and then test their blood and urine for luteinising hormone to help pinpoint the moment of ovulation.

Ye Olde Myth: Menstrual blood is poisonous to men.

Just for fun, I thought I would drag up an older period myth: that menstrual blood is extremely toxic to men. Growing up I thought boys being afraid of “cooties” were bad enough, but throughout recorded history men have had some pretty bizarre claims about the devastating power of periods.
Pliny the Elder

Pliny the Elder wrote that menstrual blood “turns new wine sour, makes crops wither, kills grafts, dries seeds in gardens, causes the fruit of trees to fall off, dims the bright surface of mirrors, dulls the edge of steel and the gleam of ivory, kills bees, rusts iron and bronze” and so on and so forth. Other supernatural properties of menstrual blood include driving dogs insane, driving away hailstorms and whirlwinds, and turning any linen you launder at that time of the month pitch black – which is a very cheap way to acquire a new goth wardrobe.

Now, as much as I like the idea that I could be using my menses to bring about a dark and terrible wave of destruction while dressed stylishly in all black, sadly reports of the awesome power of menstruation have been greatly exaggerated. The most destructive thing I can do with my menstrual blood is ruin a new pair of knickers. That being said, there is a contingent online that is very much intimidated by the concept of “free bleeding”, while at the same time being violently opposed to making feminine hygiene products more affordable.
Myth: Period Sex caused Vulcan’s Clubfoot

There are two common myths used to explain how the Roman god Vulcan gained his club-foot: the first is that his limb was damaged when Jupiter (Roman counterpart to Zeus) grabbed him by the leg and threw him down from Olympus; the other is that he was born with the deformity and his mother, Juno (Hera to the Greeks), rejected him and threw him down to earth. A lesser-known version is that Vulcan’s deformity was caused by the kind of sex that produced him: period sex [19]. Given Jupiter/Zeus’ predilection for screwing anything that moves, it’s not hard to believe that he’s the kind of guy that’s OK with getting blood on his sword.

The ancient Romans weren’t the only ones to think this way, though. In France, folk wisdom said that an infant conceived in period sex would be “puny, languid, and moribund, subject to an infinity of fetid maladies, foul and stinking as a result of the matter from which it was conceived.” [19] What “infinity of fetid maladies” would this baby suffer from? Oh, just scrofula, skin ulcers, syphilis, and, of course, leprosy. It should go without saying that none of this is true, but sadly history has shown this is not the case.

Myth: Period Blood can Cure Leprosy (According to St. Hildegard of Bingen)

Hildegard of Bingen (Hildy to her friends) was a Catholic saint and polymath (who wrote a medical textbook that included recipes for contraceptives and abortifacients), but she appears here because she apparently listed menstrual blood
as a cure for leprosy, which is interesting, because she wrote this in the same time period that menstrual blood was being blamed for causing leprosy in the first place.

Some charming fellow speculated that menstrual blood was used deliberately to harm sexual partners by infecting them with leprosy, but since they didn’t feel like writing this under their own name this asinine thought is attributed as “Pseudo-Albert the Great”[20].

**Myth: Menstruating People Make Ham Spoil (According to the British Medical Journal circa 1878)**

The full text of the British Medical Journal from 1878 is freely available online - and I am very glad that it is; otherwise I might have missed out on a series of letters between medical professionals debating in whether or not women should be excluded from curing meat during their periods on the belief that they will spoil the meat if they do. And, although the version I read looks like it was transcribed by a helpful but illiterate robot, it seems at least one gentleman wrote in to say that you shouldn’t slaughter sows until after they (the sows) finish menstruating or else the meat “won’t take the salt”.

One chap even wrote in to say he was surprised to see the question being debated, not because it was silly, but because it was already an accepted fact.

“Sir – I thought the fact was so generally known to every housewife and cook, that meat would spoil if salted at the menstrual period, that I am surprised to see so many letters on the subject in the Journal. If I am not mistaken, the question was
mooted many years ago in the periodicals. It is undoubtedly fact that meat will be tainted if cured by women at the catamenial period.” - BMJ, April 1878 [21]

Just to emphasize that last point: the British Medical Journal once had a serious discussion about whether people can make salted meat spoil just by being in the kitchen while menstruating.

Myth: Period Blood Causes Death and Destruction Through “Menotoxin”

Things weren’t any better after the turn of the century. In the 1920s, a Viennese gynaecologist named Professor Bela Schick proposed that menstrual blood contained a substance he named “menotoxin”; he claimed that menotoxin would turn wine into vinegar. Despite never actually isolating this compound (because it doesn’t exist), he nonetheless managed to convince other doctors to publish their own writings on the mysterious and powerful substance [22-25].

Myth: Menstrual Blood Love Charms

There is a surprisingly common folk belief that slipping your menstrual blood into your would-be suitor’s food will make them fall in love with you. This might seem like a superstition relegated to the past, but in 2009 an Indonesian maid working in Hong Kong was arrested after she was caught slipping her menstrual blood into her employer’s dinner [26]. Then, in 2011 another Indonesian woman in Singapore was arrested for doing the same to her employer’s coffee [27]. Apparently this myth is alive and well.
While I was researching this section, I came across a thought-provoking discussion among modern witches who posed the following question: does menstrual blood used in spells have to be fresh, or will reheated frozen blood do just as well?

So far I haven’t been able to find a definitive answer to this particular quandary.

**Myth: Vodka + Tampon = Party time!**

Vodka-soaked tampons are on my list of “things that do not go anywhere near my vagina.” The membranes lining the vagina are sensitive and introducing them to undiluted vodka is going to hurt a lot. Later, you’ll have to worry about the effect the alcohol has had on the healthy bacteria that keep your vagina free from itchy nasties; I hope you enjoy a raging case of crotch fungus, because that’s what you’ll get if you nuke your vaginal micro-flora.

Even if the excruciating burning sensation and the subsequent “cottage cheese-like discharge” in your vagina aren’t enough to sway you, consider how effective this approach is: tampons are great for mopping up endometrial blood, but even if you are packing the largest commercially available tampon, you’re still only going to get about a shot-glass worth of booze in your bodily cavity. Is that really worth the damage you are doing to your beloved sideways smile?

My advice to you is to treat yourself to a night in with a glass of wine and a moderately priced vibrator.
Let’s Get Physical
Now that we are all more intimately acquainted with our anatomy and how it works (or doesn’t work, as the case may be...) we can move on to the important question of how to get the best performance out of our sex organs.

Sexual Shenanigans

Myth: Sex is Sex the Whole World Over

With over 7 billion people from hundreds of different countries and cultures sharing the planet, it’s hard to find something we all agree on – but surely sex is sex, right? Well, turns out things aren’t so simple. Covering the full range of different cultural approaches to sex would take a multi-volume encyclopaedia of hanky-panky that would be out of date before it even went to print. Because of this, we’re just going to look at one culture that bucks the general trend of “sex is enjoyable and you should have lots of it.”

In the late 1950s, an American anthropologist named John C. Messenger went to live with people he unfortunately described as “Irish peasants” to observe their culture in the Aran Islands [28]. He didn’t set out to study their sex lives, but he ended up capturing some intriguing details in the course of being thorough.

Imagine for a moment a society where, in the second half of 20th century, the female orgasm was written off as a myth, or worse, as the work of the devil.\textsuperscript{16} Where

\textsuperscript{16} One of Messenger’s interview subjects wanted an explanation for some strange behavior exhibited by a recent sexual partner, putting Messenger in the awkward position of explaining what the female
foreplay was a foreign and poorly understood concept, even at the height of the sexual revolution. Where premarital sex was rare to non-existent. In this society, sex occurred once in a blue moon, always in the missionary position, and homosexuality was unheard of. Married couples were never naked together, men shunned their wives during menstruation, and menopause was so feared that after “the change” women were expected to retire from public life. Some even went so far as to take to their beds and wait for death to claim them.

Now imagine that you can hop on Airbnb and book a room in this real life version of *The Handmaid’s Tale*.

The place I’ve just described is Inis Beag.\(^{17}\)

Located 23 miles west of the city of Galway, Inis Beag is one of the three Aran islands, which irishcentral.com assures me are “undoubtedly the most famous of Ireland’s islands”. If you have a hankering to enjoy their quaint Irish pubs or purchase one of their distinctive hand-knitted jerseys, getting there is as simple as hopping on the ferry from the mainland at Ros a’Mhíl.

In Messenger’s day, the islanders of Inis Beag believed that sex is bad for your health, so men and women alike avoided it as much as possible.\(^{18}\) The islanders also believed that menopause causes mental illness, so women on the island just

---

\(^{17}\) Not the real name: Messenger created the name ‘Inis Beag’ in an effort to protect the privacy of the islanders.

\(^{18}\) They also believed that bad teeth are inherited, so in Messenger’s time only one islander owned a toothbrush.
accepted that their life is essentially over once they stopped getting their periods. I wasn’t kidding about the whole “taking to their beds and waiting for death” thing.

Life for women on the island was particularly bleak. Husbands and wives removed just enough clothing to allow husbands to “mount” their poor wives before they roll over and go to sleep. Girls were raised to believe that it is a sin to deny their husbands carnal demands, so most families had seven or eight children in spite of the strong antipathy to female sexual pleasure. Women were responsible for all childcare, which included knitting thick woollen underwear for the whole brood.¹⁹

Four out of the five daily meals consisted entirely of bread, which the women baked from scratch every day over a peat fire. On top of that, all of the islanders were interbred to the point of being third cousins. When Messenger visited the island, the entire population shared 13 surnames; today that number is down to 6, a fact proudly touted on the island’s website [29].

Where were the men? Getting drunk in one of the two pubs on the island. It’s little wonder that many women refused to marry and chose to leave the island forever.

The taboo towards nudity was severe. Despite the fact that fishing was a major source of income on the island, islanders were not taught how to swim, as this would have required them to remove their many layers of woollens. The islanders were scandalized by the “nude” bathing of the tourists that visited the island every

¹⁹ This woolen underwear was changed once per week. Bathing was restricted to washing the hands, feet, and face. There were no bathtubs on the island.
summer.\footnote{“Nude” in this context means “exposing their knees and elbows in public”.

When Messenger lived on the island, there was at least one case of a man dying because he was too embarrassed to consult the island nurse in case she asked him to disrobe. Even dogs are “physically educated” if they commit a public indecency like licking themselves in the street.

You might be thinking that this was a long time ago, so why should we care? Well, let’s put this into context: when Messenger first arrived on the island, Sputnik 1 was in orbit, the FDA had approved Enovid (the first commercially available contraceptive pill) for “menstrual disorders”, polio was on the way out, and Don Draper was being suave as fuck in his office at Sterling Cooper. A few years later, Yuri Gagarin would become the first human being to leave the stratosphere and the world would hold its collective breath as Khrushchev and Kennedy hovered on the brink of full-scale nuclear war. It was by no means the dark ages.

Unfortunately, there has never ben a follow-up study. This means that, short of racking up a lot of credit card debt to buy a return ticket to Ireland, I have no way of knowing how much has changed on the island. You can’t just call up and ask if knowledge of the female orgasm has reached the island yet. Well, no, you technically \emph{can} do that, it’s just frowned upon in academic circles.

\textbf{Myth: “The Donkey Punch”}

Okie-smokie, so I finally found out what a “Donkey Punch” is and I am thoroughly disgusted with the world. Wikipedia tells me that this particular urban legend says
that you can make anal or vaginal sex better by battering your sexual partner.

Already, it should be clear that this is not a thing you should do under any circumstances.

The myth is that, by punching your partner in the head, you can shock their body into producing an involuntary muscle spasm that is pleasurable for the penetrating partner. It’s also grievous bodily harm, so I hope that I get called up for jury duty again when you go on trial, you demented Neanderthal. Sorry, I got a little bit caught up empathising with the poor young lass or lad with the blunt force trauma to the brainpan.

Even if “you will go to prison” and “you’d have to be a monster to even consider this” aren’t good enough reasons not to violently assault someone nice enough to touch your genitals, physiologically there is no reflex that induces involuntary tightening of the anus or vagina following trauma to the skull. Sex columnist Dan Savage has referred to the “technique” as “a sex act that exists only in the imagination of adolescent boys.” [30] There is absolutely no benefit to anyone – but there is a very good chance of causing serious damage to the person getting battered, like brain damage, paralysis, or even death

**Myth: Electrified nipple clamps are fun!**

Having your heart stopped during a bout of electro-play isn’t a lot of fun. In fact, being dead generally is a bit of a snooze. Kirsten Maurer, 29, may have been enjoying herself in the lead up to her entirely avoidable death by electrocution at the
hands of her husband, Toby, 37, but we will never know. Because she’s dead. Really, really dead.

Mr Taylor constructed his lethal device by stripping the protective coating off an electrical cord and using the bare wires to zap his wife in the chest. Manolith.com, which puts this fatality at number 15 on their list of “15 Weirdest Sex Deaths (And How to Avoid Them),” recommends having your homemade electrified nipple clamps checked regularly by an electrician, which misses the point entirely [31].

We should learn two things from Kirsten Maurer’s fate:

1. Wiring your lover’s flesh up to a household electrical socket instead of shelling out the cash for proper electrical-stimulation toys is indescribably irresponsible.

2. Even legitimate electrical toys (that have been designed for kinky sex) should never, ever be used above the waist.

It only takes a few volts across the chest cavity to stop your heart, and the police do not consider “but she was enjoying it” as a good enough reason to let you out of a charge of reckless endangerment or negligent homicide.

Mr Taylor tried to cover up the circumstances of his wife’s death by dressing her and removing the tape he had used to gag her during the allegedly consensual but lethal electrocution; he told the police that she had accidentally electrocuted herself with a hair-dryer. Unfortunately, when setting the scene, he had failed to ensure he had the appropriate prop (the hair dryer) [32]. Rookie mistake.
The coroner that examined Kirsten’s body ruled her death a homicide. At trial, the jury didn’t hesitate to find Mr Taylor guilty of reckless endangerment, involuntary manslaughter, and third-degree murder; he is currently serving 20-40 years. When he requested a retrial, the judge remarked, “I hate to use the term because it’s inappropriate... but the verdict does not shock the senses of the court.” [33] (Emphasis mine).

Strange but True: Death by Chastity Belt

Chastity is a fun game when practiced by consenting adults with a healthy respect for the dangers involved; it’s not so much fun when it is forced on you by a jealous and abusive husband. Rosa Esquen Vela, 22, was the blushing bride of Peruvian businessman Dionicio Vela – right up to the moment when his homemade chastity device killed her [34].

You see, being a jealous, overbearing man with little concern for his wife’s comfort and safety, Mr Vela crafted a medieval torture device for his beloved wife out of what the police described as “thick, coarse rawhide”, kept locked tight around her nethers with a rusty padlock [35]. This padlock dug into her flesh, causing a life-threatening infection that did her in long before her dearest, darling husband came home with the key.

But hey, at least his wife didn’t engage in consensual sex with another person! That would have been terrible!
Myth: Urethral intercourse – they can’t possibly…. can they?!

Believe it or not, there are 26 cases of urethral intercourse documented in the medical literature. This is different to urethral sounding, when a probe or “sound” (often a medical probe designed for exploring the urethra in a diagnostic capacity) is inserted into the urethra for the sexual enjoyment of the person being penetrated. No, “urethral intercourse” specifically refers to instances when someone sticks their penis into your pee hole. Like, all the way in. And out. And then back in again. Repeatedly.

I’m originally an anatomist by training, so let me just say that I wouldn’t believe this was even possible if I hadn’t read actual case studies of the phenomenon. I can see the urethra being gently widened by sterilised, stainless steel medical instruments. I can even see why this could be appealing to some (adventurous urethral spelunkers have been known delve deep enough into the golden shower pipe to stimulate their prostate). But I cannot see a urethra going from 0 to 60 during the course of a brief bout of foreplay without tearing some rather delicate parts of your anatomy.

“Coitus per Urethram and the Rigid Hymen” not only sounds like a terrifying Harry Potter porn parody, but it also has the unique distinction of nearly killing me when I choked on my caffeinated sugar water while reading the abstract [36]. Specifically, this sentence nearly did me in: “A man made an artificial hypospadias and progressively enlarged the urethra enabling insertion of another man’s penis.”

21 “Hypospadias” usually refers to an unfortunate birth defect where the urethra ends short of the tip of the penis – i.e. pee comes out mid-shaft. Because of the embarrassment this kind of defect causes,
Like the abstract, the first case study in the body of the text posed a serious threat to my health and wellbeing. It concerns a 32-year-old woman who came to see her doctor about her persistent urinary incontinence. The good doctor believed it was important to assure us that “physical examination revealed a normally developed attractive woman.” When our medico finally got around to examining the part of her body that was troubling her, he discovered that she had an intact and almost impenetrable fibrotic hymen, which he described “admitted an index finger with difficulty.” The urethra, however, was much more pliable: “the urethra readily admitted two fingers or a large rectal dilator (Fig 1,2).” Figures 1 and 2 are forever etched on my retina.

Another, equally horrifying example involves a woman in South Africa. When she was admitted to the Bridgman Hospital, Johannesburg, to give birth the staff had an extremely difficult time assessing the dilation of her cervix [37], as the authors drolly put it “presumably because the examining finger was in the urethra and not in the vagina.” They go on to inform us that the patient’s urethra could easily fit two fingers and that she confirmed this was the orifice she used for sex.
Erotic Orifice Injuries; or Things You Should Think Twice about Sticking in Your Anatomy

No, Richard Gere absolutely did not introduce a small mammal to his rectum; there is not a single documented case of “gerbiling”, the purely fictional sexual practice of inserting a small furry pet in your anus. However, there are plenty of well documented cases of really interesting stuff going into people’s orifices – usually because the stuffer or stuffee can’t remove the object after playtime is over and a doctor (or coroner) had to get involved. This is not an exhaustive list of hole stuffing material by any means, but it is a good starting place to learn about things that to be careful shoving up your intimate apertures.

Before we start, I want to make it clear that while we can see the humour in these case studies, the purpose of this section isn’t to point and laugh at other people’s mistakes; it’s to show people that, although getting something stuck somewhere intimate can be really embarrassing at the time, you are hardly the strangest patient in the emergency room.

Another thing I want to make clear is that a lot of these cases go from comedy to tragedy because the people involved were too ashamed to get the medical help they needed in a timely fashion. If these people hadn’t feared ridicule more than they feared death, they would have hopefully lived long enough to see the funny side of getting whatever stuck wherever.
Butt Stuff

Stuffed butts are remarkably common, so let’s start there, shall we? The rectum is a bottomless pit; it forms a continuous tube from between your butt cheeks all the way to the mouth. There are some sphincters and corners along the way, but stuff can and does get through the whole pipeline (albeit, usually in the other direction).

There are enough cases of butt stuff gone awry that there are not only discussions on the best way to get these objects out in one piece but about what this the best way to talk about these incidents [38], the gender differences in butt stuffing activity [39], and even how butt stuffing changes with the seasons [40].

Non-Anal Vibrators [41-47]: Vibrators designed for anal play will have a flared base; this is to stop them getting lost somewhere in your large intestine (or beyond).

An infection is the most common consequence of putting things where they do not belong, but poorly executed anal play session can result in more serious problems. Having a foreign object in your large intestine can cause serious tissue damage that will require surgery. There is at least one documented case of a dude who died after his rogue vibrator punctured his colon, which lead to multiple organ failure and death [47]. Unfortunately, if he had sought medical attention immediately after the vibrator got away from him and his partner several days earlier he would have likely lived to get over the embarrassment.

22 October is the most popular month to lose a toy rectally, in case anyone was wondering.
Vaginal vibrators are probably one of the most common items removed from the rectum after fun-time gone wrong. The first case study I’ve found in the literature (so far) comes from 1973 and is titled “Vibrating Umbilicus”, i.e. it’s about two patients who reported to the emergency room with vibrating belly buttons [48]. Neither of the patients immediately admitted to having a still-vibrating implement of self-pleasure in their insides; instead, both complained of really, really bad tummy aches.23

**Glass [42, 44, 49-52]:** Another surprising favourite of solo anal-play enthusiasts: pretty much anything made of glass. Glass jars, shot glasses, even a Coca Cola bottle [53]. The earliest glass object through the back door that I’ve managed to find is from 1983 [51]; the patient initially claimed that the 8 cm wide jar ended up inside him after he slipped in the shower while washing his dog.24

**Salami:** This is by far my favourite object. “Rectal Salami” (brought to the world by Shah, Majed, and Rosin in 2002) is a literary treasure [54]. Unfortunately, the person the deli meat got lost inside of needed surgery to have it removed.

**Batteries [50, 52]:** I shouldn’t have to explain why this is a bad idea, but given that batteries scored an orifice hat-trick, we will soon see a prime example of why batteries don’t belong in your internal cavities.

**Butane Gas Cylinder [53]:** Presented without comment.

**Flashlight [53]:** Ditto.

---

23 The doctor writing up the two case studies did himself no favours by using this as an opportunity to make some homophobic comments about the “lax” anus of one of the patients. Brother, if you think being able to stretch to accommodate four fingers is remarkable, have I got news for you...

24 For the curious: it was a peanut butter jar.
**Shoe Horns [55]**: This is probably self-explanatory, but we are going to talk about it anyway. This is another case of someone getting hurt and being too embarrassed to get help. The shoehorn tore this poor guy up pretty badly and he ended up bleeding to death all alone. In his case, he may have bled out before an ambulance could have arrived, but the police were able to piece together his final moments and found he had time to walk around his apartment after his mishap and had plenty of time to make a phone call.

**Vagina Stuff:**

Anuses and urethras aren’t the only holes that stuff disappears into during sexy fun-time: the vagina is perfectly capable of performing the same magic trick when it wants to. While the digestive tract is one long, continuous tube between the mouth and the butthole, the vagina has a gate (the cervix) that should stop things getting away from you, but hey, anything can happen.

**Potatoes [56, 57]**: There are two reported cases of people needing help at the emergency room after inserting a potato in their vagina. The first case involved a couple who could get a potato in when they were both drunk and horny but couldn’t get it back out again when they were sober and not horny. Shah, Olah, and Jackson (2003) report that it was an 8 x 6 cm potato. The second case involved a young lady whose mother had advised her to use a potato as a contraceptive device; two weeks later it had begun to sprout and was poking her in the cervix. Ouch.
Aerosol Cans [58, 59]: This is a little subjective; you can probably shove a spray can in your vagina safely, but there are multiple reported cases of the caps coming off inside and cutting someone’s vagina up pretty badly. Ouch. First of all, if you want to insert random household objects in your vagina, that’s your business, but it’s best to use a condom; even if you wash the items before and after, you are likely to introduce some funky bacteria to your intimate regions. Secondly, a condom will probably help a little with keeping the cap on. I can’t say for sure because – as far as I’m aware – no one has yet tested this in a controlled laboratory setting.

Paintbrushes [56]: Masters and Johnson made many valuable contributions to our understanding of the physiology of our reproductive organs, and one of those contributions was to observe and report on what they called “tenting”; that is, the tendency of the vagina to expand upward and outwards when aroused. Because of this perfectly normal, physiological response, it is possible to insert things in the vagina during fun-time that are anatomically implausible at any other time. One of these things is the 18 cm paintbrush retrieved by a doctor from a 26-year-old woman’s vagina. Interestingly, she was then 31 weeks pregnant with her 6th child. The authors of the study make no comment about how the paintbrush incident may have affected the woman’s pregnancy, but do note that she delivered a healthy male infant 3 weeks after this incident, some 6 weeks premature.

Glass objects not meant for vagina fun [60, 61]: I’m a scientist-cum-writer, not a cop, so do whatever you want. I can certainly understand that some people like putting various kinds of glass objects in their vagina – it doesn’t appeal to me personally, but, hey, you do you. That being said, glass objects that aren’t designed
for sexy fun times aren’t necessarily safe to use for that purpose. Like shot glasses, coke bottles, and light bulbs. So many light bulbs [61].

An interesting read – if you are interested in glass objects in vaginas – comes to us from Jaluvka and Novak (1995) about three elderly women, two of whom initially had perfectly innocent reasons for having glass objects in their vaginas. The first, 81, claimed that she woke in the middle of night with the sudden urge to douche and oh no, the bottle slipped into her vagina! After the bottle was removed they saw it was wrapped in a kitchen glove, and the patient confessed that she had been using it once or twice per week to masturbate. The next, 73, claimed to be using olive oil as a home remedy when, oh no, the bottle slipped into her vagina! This time the bottle broke inside. Ouch.

The third woman, 69, just admitted that the shot glass in her vagina was a marital aid, employed by her husband since penis-in-vagina sex was off the menu. The only problem is that this sexual act occurred seven years earlier; her husband had forbidden her from seeking medical treatment and she patiently waited until he died before doing so. The glass had become enveloped in scar tissue over the years it had remained lodged inside her, and the glass and scar capsule both had to be removed.

**Douche Nozzle [62]:** This wasn’t done for sexual gratification, but I thought it was worthy of inclusion all the same. Dating from 1947, this is one of the earliest “foreign body” case studies I’ve been able to find. Our patient was a 60-year-old widow in the habit of douching with Lysol – the floor cleaner – and had a medical device in place to treat a prolapsed uterus. Our diligent doctor, G.J. Grainger, had to remove the medical device – a watch-spring pessary - to find the source of the “unpleasant
vaginal discharge and slight discomfort” that had been plaguing our patient for the last fortnight. He discovered the bone nozzle from her douche jammed into the pessary. When asked if she had lost a douche nozzle in the recent past, the patient replied that she had indeed lost a nozzle _nine months earlier_ but that she hadn’t worried because she assumed the cat had run off with it.

Multiple things to consider here: 1) it is generally agreed that douching is bad for the vagina, as it messes up the natural pH of the vagina and kills the helpful bacteria that keep you healthy; 2) floor cleaner goes on floors and not into bodily orifices, and; 3) don’t assume that all lost objects can be safely blamed on the cat.

**Cucumber [63, 64]:** Fruits and vegetables harbour all sorts of bacteria that are fine and dandy out in a field, but not so fine and dandy in your vagina. However, this isn’t about bacteria: while trawling through the academic papers brought up by combining “foreign bodies” and “vagina” in the PubMed search engine, I came across two papers about cucumbers and the chaos they caused. _Bladder Perforation Caused by Cucumis Sativus Repaired per Vagina_ attempts to obscure the subject with a cloak of respectable Latin.

Essentially, our 33-year-old mother of three had been enjoying a cucumber in her spare time and ended up with two large tears through her vagina, one of which tore all the way into her bladder. Not fun. It wasn’t even a particularly large cucumber: it was only 10 cm long. The other case study gets right to the point: _A cucumber in the abdomen penetrating through the vagina_. 
**Deer Tongue [65]:** This case study instantly endeared itself to me. The ‘specimen’ was sent away for histological analysis because the patient it was removed from refused to name the object. Reading the article, I got the impression that the tongue had been frozen at one point, but I am still unclear on whether it thawed pre- or post-insertion. I’m also not sure if this counts as bestiality or not. Interestingly, the patient’s initial complaint was not “there is an animal part inside my vagina”, but suspected pregnancy.

**Jewellery [66, 67]:** *The Case of the Missing ‘Prince Albert’*<sup>26</sup>, by Das, Rawal, and Bolton (2005), concerns a young woman whose partner lost the little steel ball from his ball-ring closure penis piercing during intercourse. A visual inspection of the vagina failed to spot the fugitive piercing, but it was finally tracked down with the help of a pelvic X-ray.

While the Prince Albert ring was quickly located and removed, the bracelet lost inside a woman from Puducherry, India took a lot longer to resurface. The then 60 year-old woman reported to a local hospital with vagina troubles, which were eventually explained with the discovery of a metal bangle bracelet. When prompted with the piece of jewellery, the patient recalled inserting the bangle as a DIY treatment for a prolapsed uterus – *thirty years earlier*.

**Tennis balls [68]:** Not a sexual mishap, but noteworthy nonetheless. An 82-year-old woman reported to a gynaecology clinic in Turkey with “foul-smelling vaginal

---

<sup>25</sup> The species of hooved ungulate was identified in this case based on the type of parasitic cysts in the muscle fibres. They included several large photographs of the cross-sectioned tissues under magnification, in case the readers wanted to see the cysts for themselves. I think that’s great.

<sup>26</sup> Sounds like the start of a Sherlock Holmes mystery.
discharge and bleeding”. As well as discovering some “foul-smelling greenish discharge”, the doctor who examined her also found two tennis balls. At this point the patient recalled inserting the balls – thirty-five years earlier – as a dual contraceptive and DIY treatment for a prolapsed uterus following the birth of her 7th child.

**Batteries [69]**: A 44-year-old woman had been using batteries to masturbate but couldn’t get the last one out. She left it in her vagina for the next 2 months until she was admitted to her local emergency department with a fever and persistent vomiting. Surgery revealed an AA Duracell battery, which had corroded and begun to leak battery acid. Ouch.

You might be thinking “didn’t we see batteries in the butt-stuff section?” The answer is yes, we did. And you can look forward to seeing batteries again in the urethral section too.

Apparently batteries have an irresistible allure.

**Things to be careful with in your urethra:**

Articles about urethral objects tend to call urethral sounding a “rare” sexual behaviour but the sheer number of case studies published about the phenomenon suggests that it’s not rare enough to skip over.27 “Although uncommon, the discovery of a foreign body in the urethra is an event that every physician, especially urologists, may be confronted with during his medical practice.” [70]

---

27 I have several friends who are fond of the activity, but that says more about the sort of friends I make more than anything.
Raw spaghetti [71]: The strand of spaghetti snapped in the middle of kinky fun time and caused enough scar tissue to build up in the urethra that it had to be corrected with surgery. Ouch.

Pencils [55]: There is at least one recorded autoerotic death brought on by a pencil in the urethra. A 40-year-old man died from peritonitis after a pencil he was using as a masturbatory aid got away from him; after travelling through the urethra, the pencil punched a hole through the wall of his bladder and into the abdominal cavity. This caused a massive infection that eventually killed him. Notice I said “eventually”. Our hapless urethral-sounder was alive and walking around for several days after his mishap, but at no point did he seek the medical care that probably would have saved his life – and it’s pretty obvious why: getting a pencil stuck in your urethra is kind of embarrassing.

Consider this, though: apart from the doctors and nurses at the hospital, no one else would have known what happened if he’d gotten help. Because this guy died, his family had to be notified, there had to be an autopsy and an inquest, and all his friends would eventually wonder, “Hey, whatever happened to Dave?” And we only know what happened to Dave because it got written up as a case study that has been read by hundreds if not thousands of people. Which scenario sounds more embarrassing to you?

---

28 As far as I know, not his real name.
29 Still not his real name.
**Ballpoint Pens [72-74]:** Like pencils, pens are another relatively common object removed from the urethra and bladder. Ballpoint pens at least have the benefit of being less pointy and pokey, which is possibly why I haven’t read about any deaths associated with pens in the urinary tract. There was an interesting case from Brazil of a woman who had been using a pall-point pen as a masturbatory aid for several years and had had one of these pens lodged in her bladder for at least a year by the time she presented to the emergency department; she was, apparently, unaware of when *exactly* her urethra had taken long-term possession of the pen. The case is interesting because, while they could clearly see the pen on an X-ray, they couldn’t see it when they sent a camera in looking for it – it had seemingly vanished. It was only when they performed an exploratory operation that they discovered why: the bladder had sort of “absorbed” the pen and built a fleshy capsule around it. The pen and the capsule both had to be surgically removed, but I have to say that it is a very nice looking pen.\(^{30}\)

**50 cm of Plastic Tubing [75]:** Some poor chap from Canada managed to lose half a meter of plastic tubing up his urethra; however, he did the sensible thing afterwards and went to have it removed by the experts at his local hospital. It had coiled around itself in his bladder, which made the removal a little tricky, but there was no lasting damage. I can see how he would think that 50 cm was a safe enough length to assume it wouldn’t be able to get away from him, but it did. As I say to my flatmate’s strong-willed 6-year-old “nobody plans to have an accident, but they happen all the same.”

---

\(^{30}\) I’m into stationery.
Electrical Wiring [76, 77]: A popular object for anuses and urethras alike. There is at least one recorded case of someone dying of gangrene after getting a piece of wire stuck in his or her urethra. Oh dear...

Batteries [78]: We’ve already seen why this is a bad idea, but I wanted to emphasise that this is a popular object in all three erotic orifices.

Nylon Fishing Line...with the Hook Still Attached [76]: The fishing line and hook were removed from someone’s bladder; unfortunately, the article doesn’t explain how the hook got all the way down the urethra before getting stuck, which is something I would dearly like to know.

Blu-Tack [79]: This one is fucking adorable. A guy had his Blu-Tack phallus get away from him, and at body temperature it was too soft to grasp with a pair of forceps and retrieve from the bladder. The doctors ended up calling the manufacturer to find out at what temperature the Blu-Tack would be solid enough to snag like a toy in a claw-machine. Bostik Laboratories obliged and discovered that Blu-Tack becomes firm enough to grab at about 0 degrees centigrade (and becomes completely solid at – 40 degrees). To achieve the appropriate temperature, the doctors filled the patient’s bladder with water chilled to 0 degrees and the Blu-Tack was safely removed without major surgery. This was good news, because two more cases of Blu-Tack urethral trouble turned up at the same hospital within the next few years.

So what was the first guy doing with the Blu-Tack? Turns out he was in the habit of inserting the Blu-Tack mini-phallus during masturbation and allowing it to return
to him naturally at ejaculation. One time, it didn’t come back. He did the right thing by getting help straight away.

**A Snake [74]:** Removed from the bladder of a 45 year-old man. The snake measured 16 inches (sans head, which was removed before insertion).

**Lessons to learn:** The fact that sexual arousal can dim even the brightest bulb (intellectually speaking) aside, there are a number of questions you should ask yourself before you make the decision to insert an object into one of your orifices. First of all, is the object clean? Secondly, what are the chances of it getting away from you? Thirdly, is this something you are willing to go see a doctor about having removed?

If the answer to any one of these three questions is “no”, then you might be better off delaying your sexual gratification until you can lay your hands on something more suitable.

If something does get stuck, remember the list of objects we’ve just gone through together; while getting whatever stuck wherever might be the most mortifying thing to ever happen to you, to the doctors and nurses helping you it will simply be another day at the office. It might even be a little boring for them – “oh, another pen/vibrator/bottle/chopstick/whatever, better get the extra-long forceps out...” While you are stewing in embarrassment, your doctor is probably more interested in whether or not the object is unusual enough to publish as a case study.
Emma Phillips, a British student, had the right idea. When the vibrator she and her partner were using vanished up her backside, they went to the hospital and had it removed [80]. There was no lasting damage and the pair could have taken this secret to their graves if they had chosen to do so. But Emma, being a strong-willed and intelligent person like all Emmas are, decided to share her experience on Facebook to inspire people in a similar predicament to seek medical attention. And she probably has helped, given that the article about her is the first result you see if you Google “vibrator got stuck”, which is how I found the story in the first place. In fact, Googling that same phrase will also bring up a story about another woman who lost a vibrator in her urethra, which the ER doctor maintained was “really impossible” until she saw it for herself [81].

On a more positive note, a decent sex toy is a good investment. My first vibrator was probably the best $29 I ever spent. Even if the sex shops near you are weird and kind of scungy, the internet is approximately 90% ads for sex stuff; you can and will find the sex toy of your dreams online.31 What floats your boat might not be as easy to get as putting $30 (including batteries) down on a vibrator at a shop on the main street of your town, but it’s worth it if it makes you happy and doesn’t put you in the operating theatre.

31 A nice website that I totally don’t spend a lot of money at has one called the Ultimate Asslock that is based on my favourite medieval torture device, the Pear of Anguish.
Potions and Sexy Sorcery

Myth: Spanish fly is a powerful magic potion you can use to inspire desire in an otherwise unwilling partner + Strange but True: Actual magic potions you can use to add some spice to your love life

You might have heard about a lady known as Madam Ruth, who lived at 34th and Vine, and who made her living selling little bottles of Love Potion No.9, either from the song or the terrible movie of the same name. Well, Madam Ruth may have been fictional, but Stephie Key, the daughter of the former Prime Minister of New Zealand John Key, is very much real and is putting her expensive education at the prestigious Paris College of Art to practical use by making and selling love potions. It’s just fabulous to see the child of a politician doing their bit to remedy the skills shortage.

Now, most of us don’t really believe that magic potions can be obtained affordably from our friendly, neighbourhood witch, but I’m willing to bet that some of us are less than sceptical about certain herbs or foods with a reputation for getting your engine running. The media likes to encourage us to believe that we can procure some literal spice for the bedroom from our local supermarket, like a Cosmo article I came across recently that recommended introducing lemons and chilli peppers into my foreplay. Lemon juice isn’t the sort of thing I want near my erogenous zones and I’m allergic to chilli peppers, so you are unlikely to find those two ingredients in my bedside drawer.

One of the problems about writing about aphrodisiacs is that every man and his dog has their own list of herbs, spices, fruits, vegetables, and animal parts capable of
arousing carnal passions, and what is regarded as hot stuff by one source doesn’t warrant a mention in another.

For this book, I’ve decided to limit myself to writing about substances that actually work\textsuperscript{32} and which you, the reader, can reasonably expect to buy in your own city and not fabulously obscure roots and herbs that would require a trek through the Amazon.

Thankfully, the internet has done a very good job of globalizing the sex supplements market, so even in a country like New Zealand, (which is apparently a location so exotic that you often can’t get simple things like clothes or books delivered from overseas), you can get your eager little hands on all the horny goat weed your genitals desire.

\textbf{Spanish Fly [82-84] \textit{Lytta vesicatoria}}

The \textit{Lytta vesicatoria} beetle is the most famous of a number of species known as blister beetles, and is popularly known as the “Spanish Fly” although it is found throughout Southern Europe and Central Asia. Historically, apothecaries used it as an irritant and diuretic – but always in extremely small doses, since it is a potent poison. For some reason, it gained a reputation in folklore as an aphrodisiac, but even the alleged mechanism of arousing desire sounds incredibly unpleasant: it causes intense irritation and inflammation of the urinary tract, like having the world’s worst UTI [85, 86]. The theory is that setting your would-be partner’s genitals on fire would

\textsuperscript{32} Listing everything that \textit{isn’t} an aphrodisiac would be a never-ending and thankless task.
get them feeling amorous, but having your urethra swell shut with blisters sounds like it would spoil the mood. A study on rats in the 60s confirmed my hunch: they were no more likely to get it on than the placebo group [87].

Nonetheless, there have been people both selfish and foolish enough to actually use this stuff on their fellow human beings. The Marquis de Sade was usually in trouble with the police for one thing or another – like masturbating on a crucifix while propositioning his house-keeper, which ran afoul of the anti-blasphemy laws of pre-Revolutionary France – but in one particularly memorable instance in 1772 he was sentenced to death in absentia after he slipped Spanish fly roofies to a few sex workers in Marseilles without their knowledge. Fortunately, although the young ladies became seriously ill, none of them ate enough of the deadly aniseed pastilles for any of them to actually die.

A middle-aged middle manager in 1954 actually did relieve two young ladies of their lives for having the audacity to say “no” to him. He worked in a chemicals factory, which meant he had easy access to cantharidin, the active and extremely poisonous ingredient in Spanish fly. Despite being explicitly warned not to even touch the stuff by the chemist in charge, he laced some raspberry ice squares with enough cantharidin to kill and handed the doctored pieces out to a young secretary and a recently engaged beauty queen who had the supreme misfortune to share an office with him.

Their killer was caught red-handed – and red-faced - because cantharidin causes intense blistering and burning of the skin on contact and he apparently had been so

33 He was reportedly trying to liven up an otherwise dull and routine orgy.
eager that he didn’t bother to wear gloves or even wash his hands, leaving ample evidence of his guilt literally on his face and hands.

**Nutmeg** [84, 88, 89] *Myristica fragrans*

Depending on whom you ask, nutmeg is a hallucinogenic drug, a harmless additive to a cup of coffee, something to be grated into a mug of warm milk to soothe fussy children, a red-hot aphrodisiac used by the Queen of Sheba, and the main ingredient in a DIY abortion [90]. Even before investigating the merit of the claims about this humble nut, I have to say that abortions are one of those things where you should always hire a professional.

One of the books I consulted on the subject waxed lyrical about the fashionability of nutmeg among the powdered and brocaded gentlefolk of the 18th century; at first I thought was a bit of an embellishment, but this piece of romantic whimsy is backed up by the existence of many darling silver nutmeg boxes, complete with tiny graters, that an 18th century gentleman could keep in his waistcoat pocket.

I haven’t been able to find the published results of any human trials, either because they haven’t been attempted or because they found no effect and fell victim to publication bias, but there are two studies looking at the effect of nutmeg on the libido of rats and mice. Both of these endeared themselves to me by using two control groups: one that got only distilled water and no nut extract, and a second control group that got a dose of Viagra so that we can see how nutmeg compares to proper penis pills. (If they had used only the water control group,
neither of these studies would tell us anything about how nutmeg compares to ‘the real thing’).

These studies used male mice and rats given a nutmeg extract, and the female rodents were given hormones to get them into an amorous enough mood to be bothered with their male counterparts. Female rats and mice that weren’t in the mood were swapped out with more randy cage-mates in order to allow the male rodents full opportunity to get frisky. And frisky they did get: those that received the highest dose (500mg of nutmeg extract per kg of rodent) were above average on all counts, while the other treatment groups over-performed in proportion to their dose. The highest dose group came very close on a variety of measures to the erection drug, which is the important bit: a new medicine needs to be at least as good as the current standard treatment, otherwise what’s the point?

**Vanilla *Vanilla planifolia***

Vanilla is one of the foods that ended up on the list of supposed aphrodisiacs for having a suggestive shape; Spanish physicians in Mexico decided the seed pods of a native orchid (from the Greek word, “orchis”, for testicles) looked yonic\(^ {34}\) and decided to call it “vainilla” after the word “vaina” for “vagina”. Madam de Pompadour is alleged to have believed in the “warming” properties of vanilla, along with truffles and celery, as a way of retaining the attention of Louis XV.

Maybe “vanilla” was a poor choice of flavour to describe unimaginative sex.

---

\(^{34}\) Like a vulva, the counterpoint to “phallic”, like a penis.
**Bufo Toad [82-84] _Incilius alvarius_**

I wasn’t going to include this because I doubted psychedelic toads would be easy to obtain for the average consumer, but a quick Google search has revealed that the Bufo toad, AKA the Colorado River toad, is something that you can buy over the internet. You can even get your own breeding pair for a few hundred dollars.

However, unless you know how to milk a toad humanely and have a lot of money to throw around, I’d give the bufo toad a miss: the aphrodisiac effect is probably due to the psychedelic properties of bufotenin, a form of toxin excreted by the toad as a self-defence mechanism. You can receive the same benefit from magic mushrooms with less cost and effort.

**_Tribulus terrestris_ (TT) [82, 84, 91-93]**

This creeping perennial grows worldwide and is a key ingredient in some bodybuilding supplements. Studies in animals show that it can boost testosterone levels in the blood, possibly by stimulating androgen hormone receptors in the brain - and juicers use it in an attempt to return their testosterone levels to normal after abusing steroids.

Studies on rats and rabbits found it could cause erections and restore sexual function after castration (yikes). However, studies using human subjects have not shown the same dramatic effects on the reproductive organs, so the muscle men might be barking up the wrong tree. If you think your flagging performance might be
due to a lack of testosterone, I’d recommend seeing your doctor about treatment before I’d put my faith in body builder supplements.

**Saffron [82, 94-97] Crocus sativus**

Ah, exotic spices to inflame passion – but do they work? Saffron is available from the supermarket (at a steep price) but it has a reputation as a luxury, so maybe it can exert a psychological effect on the consumer.

As for physical effects, a few studies have been conducted using rats and it sounds like they got pretty frisky: the rats fed the saffron extract experienced increased “erection frequency” and took shorter breaks between bouts of coitus. Let’s take a moment here to appreciate the grad students that sat in a lab with stopwatches and watched rats mount each other.

The results from human trials are a little bit murkier: one study in 2009 used a small study group (20 dudes with erectile dysfunction) but a high dose (200 mg of saffron extract per day) and measured some pretty darn specific dimensions of the participants’ erections, including “penis tip rigidity, tip tumescence, base rigidity, and base tumescence” and found significant improvement on all counts\(^{35}\); a study from 2010, however, had a large study group (346 dudes with ED) and a low dose (30mg of saffron extract) and found that the dudes did not experience significant improvements in their sex lives.

\(^{35}\) I could have just said “better erections” but how many opportunities do you get in life to say “penis tip rigidity, tip tumescence, base rigidity, and base tumescence”?  

70
Obviously we have a problem here: the first study had a very, very small study group to base a conclusion on, but the second study used a very, very small dose, so neither of these studies is conclusive. On the other hand, saffron isn’t dangerous unless you eat a lot of it, more than 5 grams per day, so I don’t see any harm in spicing up your love life with literal spice. Feel free to get a tape measure out and write down your vital statistics after your chicken biryani – but maybe wait until you are in the privacy of your own bedroom, as some dinner guests will take offense to indecent exposure.

**Yohimbine [82, 84, 98-105] *Pausinystalia yohimbe***

The yohimbe tree is an evergreen native to West Africa and parts of Asia, and yohimbine is an alkaloid derived from its bark. It is widely available in dietary supplements and has been approved by the FDA as a prescription drug for the treatment of erectile dysfunction since the late 80s. Studies using in vitro human tissue have found that yohimbine can relax the smooth muscle cells in the penis – which increases the blood flow to the penis and causes an erection; this has been backed up by experimentation in rats that showed a significant uptick in sexual activity and stiffer rodent erections, but clinical trials involving humans have had disappointing results. It seems that yohimbine is better suited to treating psychogenic dysfunction than organic dysfunction i.e. yohimbine is worth trying if you have performance anxiety but you should look elsewhere if your problem is in your hardware.
**Horny Goat Weed (Epimedi herba) [82, 84]**

We’ve probably all heard of horny goat weed – a name like that is fun to say and tends to stick in the memory – but does it live up to the hype?

Studies on horny goat weed have been confined to a few animal species, but there is evidence to suggest that a component of the herb, icariin, can relax the smooth muscle cells in the penis and cause erections. Icariin is a PDE5 inhibitor (which you don’t need to worry or care about) making the smooth muscle cells in the blood vessels of the penis relax, allowing them to swell with blood, causing the whole structure to blow up like a balloon.

Interestingly, when Viagra tried to patent itself as the first PDE5 inhibitor used medically to treat erectile dysfunction, the historic use of horny goat weed in Chinese medicine was used to knock down that particular claim; the Viagra patent still protects the manufacturing process and chemical formula of the drug sildenafil (which is what Viagra is called when it’s at home) but it had to drop its first-of-its-kind claim.

**Ginseng [82-84, 106-111]**

Ginseng has been a staple in Chinese medicine for millennia, a fact acknowledged by Linnaeus when choosing its Latin name: *Panax ginseng*, with “panax” being the root for the word “panacea”. Touted as being good for all sort of things, ginseng is produced in ridiculously large quantities and sold all around the world, both in dried root form and in every conceivable kind of “health” food.
When even the Latin name claims something is a panacea, it’s probably inevitable that someone is going to promote it as a remedy for impotency – and this certainly is true for ginseng. Unlike the majority of the substances in this section, there is no shortage of human clinical trials assessing the libido-enhancing effects of ginseng and the good news is that does seem to be effective at banishing erectile dysfunction a lot better than the placebo.

Another way ginseng is unlike the other entries in this section is that it’s also been tested on women! You may have noticed a strange penis obsession in the other entries; the studies mentioned in other entries in this section have measured a whole host of strange and wonderful metrics of the male sex organ and its function, but aside from one study going into uncomfortably intimate detail about how the female rats were manipulated with hormones to get them “receptive” to the attentions of their male cohorts, very little ink has been devoted to female sexual pleasure. Not so with ginseng: women were given 3000 mg per day of ginseng extract or a placebo, and the ginseng group reported a significant increase in sexual arousal and satisfaction. However, I should point out that the women in the study were chosen because they were suffering sexual dysfunction brought on by menopause, so it might not so satisfying for those of us still plagued by vengeful ovaries.
Sexual Healing

Ever wonder why smallpox, the notoriously deadly and dreadful disease, is the “small” pox? Wouldn’t such a serious illness be given a more impressive name, like maybe the “great pox”? That’s a more suitable name for such a horrible illness, surely.

Well, “great pox” was already taken. By syphilis.

Yes, the syph was once considered a more serious scourge than smallpox. Now something routinely cleared up in a few weeks with a course of antibiotics, the syph used to be untreatable and lead to lovely conditions like blindness, facial disfigurement, insanity, and death. When penicillin was invented in the 30s, humanity was finally free to bone to their heart’s content with nothing more serious to worry about than being ostracised for an unwed pregnancy, being enslaved in a Magdalene laundry, and possibly dying in a back-alley abortion. Simple times. Of course, AIDS came along in the 80s and took nearly all the fun out of having unprotected sex with strangers, but that 50-year-stretch was a good time for those who devoted their leisure time to the single-minded pursuit of casual, precaution-free sex.

Fortunately, modern medicine allows us to avoid most of the risks associated with having an orgy. “We have the technology”, but do you know enough to take advantage of it?
Myths and Misconceptions

Emma Harcourt

To Conceive or Not Conceive

Myth: You can’t get pregnant if you are breast-feeding.

Sorry, but you can totally get preggers while you’re breast-feeding (I’d advise putting the baby down first so you can have both hands free).

Although it’s true that breast-feeding can prolong the time between popping a tiny human out of your vagina and your uterus recommencing its ritual shedding, you can’t count on it as a method of birth control. Some poor unfortunate souls get pregnant straight away after giving birth even if they are pumping out enough milk to run a small dairy farm.

On top of that, you really shouldn’t be having penis + vagina sex (or anything + vagina sex) for at least 6 weeks after ejecting an infant. The reason being that when an embryo implants in your uterus, the placenta digs right down into your flesh like a facehugger from the Alien franchise; there it rearranges your veins and arteries so the foetus can siphon nutrients and oxygenated haemoglobin straight out of your blood. When you give birth, the placenta rips off the lining of your uterus and leaves your arteries exposed and vulnerable.

Any kind of vaginal sex – including cunnilingus – can force air into the uterus and cause an air embolism to enter your blood stream and kill you. I’m not kidding – people have died from having their partner go down on them too close to baby eviction day [112-116]. That’s a ridiculous way to die, don’t do it.
Myth: Douching with Coca-Cola after sex is a smart thing to do.

A lot of sex research is surprisingly not-fun: rape, miscarriages, paedophilia, pre-teen pregnancy, and AIDS are just some of the things that dampen your enthusiasm for research and for life in general. However, sometimes sex research is such a glorious thing that you have to share it with the world in the form of a popular science book for others to enjoy. The Coca-Cola douche is one of those glorious things.

Now, it’s not all that strange that people have been douching with Coca-Cola. On a scale from yogurt and baking soda to floor-cleaner and crocodile dung, Coca-Cola is on the “doesn’t make you cry for humanity” end of the spectrum. What’s unusual is that people have gone to the trouble of testing different soft drinks to evaluate how good they are at zapping sperm – first in 1987, comparing the different varieties of Coke to Pepsi [117], and again in 1992, this time comparing Coke and Pepsi to Krest Bitter Lemon [118], whatever that is...

While the authors of the original paper found that New Coke was the closest to decreasing sperm motility to within 70% of the control spermicide in the space of an hour, none of the Coke or Pepsi varieties passed muster as a contraceptive. The 1992 study (courtesy of the Obafemi Awolowo University, Nigeria) backed Krest Bitter Lemon as being able to immobilize sperm in as little as 60 seconds, which is a little more promising than the results from Hong et al.’s soft drink spermicide study.

---

36 Hong and friends were honoured (somewhat belatedly) with an Ig Nobel in 2008. Accepting the award for Chuang-Ye Hong was his daughter, Wan Hong, who quipped: “I am 24 and it was precisely in 1984 that they tried it,” (2008 – 1984 = 24)
Even if fizzy drinks were an effective spermicide, sperm can be up and through the cervix in minutes after an ejaculation, so you’d have to be exceptionally quick with your fizzy douche. A better alternative is to get yourself a cervical cap – also known as a diaphragm – and smear that with a real spermicide to zap the little buggers in an instant. The best method for a uterus owner is a hormonal contraceptive, like an IUD or the little implant sticks that go under your skin. Testicle bearers are stuck with condoms and the snip as their best options for avoiding a ticket to babyville.

**Myth: The Morning After Pill Is a “Mini Abortion”**

This myth is close to my heart, as it is the basis of my master’s thesis: that people think emergency contraceptive pills (ECPs, AKA morning after pills) can stop a new embryo from implanting in the uterus or even dislodge an established pregnancy. This is the reason given by doctors who refuse to prescribe and pharmacists that refuse to dispense or sell the medication: that it’s all about the embryos. The truth is that the most commonly used ECP (levonorgestrel, commonly sold under the names ‘Plan B’ and ‘Postinor’) works by hitting the pause button on your ovaries; no egg means no sperm and egg fusion, which means no bebe [119].

You’d think that this aversion would extend to all medications that could – even theoretically - harm an embryo or fertilised egg, but a study in Nevada found that pharmacists were more likely to refuse to dispense the emergency contraceptive pill
than they were to dispense regular oral contraceptive pills, which can stop an embryo implanting [120].

**Myth: The Morning After Pill Encourages Risky Sex and Promiscuity**

That the legal availability of emergency contraception turns us into sex-crazed bug-chasers is unfortunately almost as common as the last myth we looked at. Both medical professionals [121-123] and the public [124, 125] have expressed the belief that the emergency contraceptive pill causes people to throw caution to the wind and leave their common sense to languish in the gutter. A study of university students in Ethiopia even found that 7.6% believed that taking the emergency contraceptive pill could give you HIV [125].

However, these prejudices aren’t backed up by evidence: a Cochrane systematic review looking at 11 randomized controlled trials in four countries (including nearly 8,000 people) found that easier access to the emergency contraceptive pill did not radically change sexual behaviour. There was no increase in pregnancy or STI rates, nor was there a decrease in the use of reliable contraceptive methods. In fact, the only change seen was that easier access resulted in faster and more frequent use of the emergency contraceptive pill – i.e. that easier access to the pill made it easier to take the pill when you need it and on time.

---

37 The study found that Nevada pharmacists were more likely to dispense erectile dysfunction pills than fertility meds for couples trying to conceive, so go figure.
Hey Doc, Can You Look At My Rash?

Myth: HIV particles can pass through the latex in condoms so I shouldn’t bother even trying to avoid HIV.

Contrary to what Emperor Palpatine Pope Benedict XVI said, condoms are not rubber sieves that help spread HIV.

Latex condoms are double-dipped to make them impervious to fluids like semen. This is something you can test at home if you don’t believe me. Go on, get a condom and fill it up like it’s a water balloon (i.e. with water, not semen). I’d say “go throw it at your least favourite neighbour” but I know from personal experience that the latex might be too strong for it to burst in a satisfying way, and, besides, you might live in one of those countries where people treat guns like toys and I’d rather not be named in a wrongful death lawsuit.

Anyway, the point of that little experiment is to demonstrate that water molecules, which are 0.287 Nano microns in size, can’t leak through the latex in condoms. HIV particles, which are about 120 to 200 Nano microns in size (i.e. about a thousand times bigger), also can’t leak through.

Latex condoms are held to super high standards, so you are pretty safe IF you are using your condoms correctly. Now, I’m not just talking about rolling them on the right way up, I’m talking about keeping them dry, out of direct sunlight, and not in your freaking wallet! In your wallet or your pocket, the latex is subjected to heat and friction before you even rip open the foil, both of which can damage the latex. If in doubt, throw it out – and then get a new one.
While we’re on the subject, another way you can mess up your condoms is by using an oil-based lube (it destroys latex, do not use!), forgetting to squeeze the air out of the tip before you roll them on, and by “double-bagging”. One condom is fine, two condoms is a bad idea.

In New Zealand, at least, condoms are extremely affordable. If you get a prescription for them the next time you see your doctor, you can get 144 name-brand condoms for $5. You can even ask for flavoured ones!

If you or your partner is HIV+, there are things that both of you can do to minimize the chance of spreading the infection on top of being extra careful with condoms. People with HIV can be vigilant about taking their medication and getting their viral load checked regularly. 38 People without HIV can use PreP, which stands for Pre-Exposure Prophylaxis; when used perfectly and in conjunction with condom use, PreP can reduce your chance of contracting HIV by 99%.

PreP drugs haven’t been approved in New Zealand yet, but they are approved in the USA, Canada, Australia, Israel, Kenya, South Africa, and the EU. If you don’t live in a country with PreP drugs, you can still get PEP or Post-Exposure Prophylaxis if you have a condom mishap. Fortunately, Truvada (the brand-name of the most commonly used PreP drug) has entered the drug-approval pipeline here in New Zealand and is expected to be available within the next 12 months. There is still debate about who should pay the $800 per month for the drug – PHARMAC or

38 If you are HIV positive, the guidelines say you should get tested every 3 to 4 months if you aren’t currently being treated with anti-retrovirals, and once or twice every year once you are on a stable treatment regime.
individuals at risk of HIV – but with the copyright on Truvada set to expire in July 2017, that point could soon be moot.

Strange but True: Fellatio Fever

For six months, a 27-year-old woman in India had suffered with a persistent cough and fever. For the last four of those months, her doctors had tried antibiotics and anti-tuberculosis treatments, but nothing helped. An X-ray showed some kind of mass in the upper lobe of her right lung, so they scheduled a videobronchoscopy; basically, they stuck a camera down her windpipe and into her lung to see what was up.

It was a condom.

Turns out the young lady had inhaled it half a year earlier during a blowjob [126].

Yikes.
And so to bed...

We have, unfortunately, reached the end of our brief foray into myths and misunderstandings. Although tens of thousands of words might not seem “brief”, in the grand scheme of things we have barely scratched the surface. There are still undiscovered countries – places marked on the map of the mind with “here be dragons” – and even a lifetime spent searching wouldn’t be enough to chart every inch of territory in the realm of sex. The sheer breadth of behaviour and biology makes fools of us all, but that’s no reason not to try.

The point of this text was never to turn you into a sexpert. It was to impress upon you that ignorance and shame are the causes behind a lot of the sex-related woe people experience. You don’t have to know everything, but it helps to have an open mind and to at least try to overcome the culturally instilled feelings of embarrassment that have been foisted upon us since infancy.\(^39\) Besides, a lot of this stuff is pretty funny.

I hope that I’ve managed to plug a few shiny things in your metaphorical holes.

Ciao.

\(^{39}\) “Johnny! Get your hands out of your pants, right now!”
Myths and Misconceptions

22. Christiansen, W., *Das Menotoxinproblem und die mitogenetischen Strahlen*. 1929.
34. *Chastity Belt Death*, in Orlando Sentinel. 1987, Orlando Sentinel.


