

Embedded Design

Words Helen Brown

Intrauterine devices (IUDs) – colloquially called coils in the UK – hit the headlines recently. After Lucy Cohen suffered an agonising coil insertion that left her screaming in pain, she set up a petition asking for pain-relief options beyond a couple of paracetamol, and better information about the insertion and removal of the devices. “[Real] consent,” Cohen wrote, “can only be given once all risks, including that of extreme pain, have been explained.” Influential women rallied around Cohen’s cause: writer and feminist activist Caroline Criado Perez, *The Times* columnist Caitlin Moran and BBC presenter Naga Munchetty all shared their traumatic experiences of the procedure. “We all know that coils are safe and effective and lots of women have no problem at all with them,” Munchetty said, “but like all medical procedures, there’s a vast range of experiences.”

Images courtesy of the Museum of Contraception and Abortion, Vienna.



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Before Cohen’s petition, the coil had enjoyed largely good press. A 2014 *Forbes* article titled ‘Can the IUD Prevent Poverty, Save Taxpayers Billions?’, for instance, posited the coil as an effective means of reducing single motherhood, while a 2015 *Economist* article, ‘Taking the Bother out of Birth Control’ promoted it as a nifty solution to teen pregnancy. “They work better because once they are inserted, you don’t have to think about them again,” *The Economist* explained. “This means they are less fiddly than the pill, which a woman must remember to take every day, or the condom, which a man must put on when aroused and perhaps not thinking straight.” Indeed, promoting access to Long-acting reversible contraception (LARCs) – methods that are either inserted or injected into the body by a doctor and can’t be meddled with by the user – has been part of NHS policy to reduce unintended pregnancies since 2005.

Yet a report published in June 2021 by the British Pregnancy Advisory Service (BPAS) revealed a side of the coil that is even darker than tales of blood-curdling screams during insertions: almost half of those using a LARC felt pressured into getting one. Even scarier, of those who wished to have it removed, 56 per cent were impeded from doing so. The aspect of the coil that is most celebrated – the fact that a woman doesn’t have to (or can’t) control it once it has been inserted – is clearly double edged. Users also felt that medical professionals withheld information about different brands and sizes, and played down side effects, limiting their ability to properly consent to the devices. “The UK mainstream framing of contraception and LARC is lacking in historical memory,” BPAS warned. As well as its many positive impacts as a form of contraception, the coil has a long history of tragedy that stretches into our present day. Its design has been left relatively untouched for more than half a century, but its shape, size and materials all have serious consequences and implications.

The modern coil came into widespread use in the 1960s, when America was in the thrall of

the population-control movement. In her 2011 book *The Global Biopolitics of the IUD*, gender and sexuality professor Chikako Takeshita sets out how advocates of population control believed that unless birth rates fell in the global South, “famine, economic collapse, environmental devastation, political turmoil, global instability, national conversions to communism, and even nuclear war were imminent”. With influential supporters in institutions such as the United Nations, International Planned Parenthood Federation, and the Ford and Rockefeller Foundations, population control was far from niche. Fuelled by this ideology, the Population Council, an American NGO, aimed to develop a contraceptive that could be tailored to control the fertility of low-income women and women of colour, and the coil was chosen as a promising method. “No contraceptive could be cheaper, and also, once the damn thing is in, the patient cannot change her mind,” the Planned Parenthood president Alan Guttmacher wrote in 1964 to the pharmaceutical company G.D. Searle.

Although the way in which coils work is not definitively understood, it is widely believed that placing a foreign object in the uterus produces an immune response that prevents fertilisation and egg implantation. In the case of modern coils, this is supplemented by either the spermicidal effects of copper wire, or the steady release of hormones to prevent conception. Early coils, however, depended on the immune response alone, with designers in the 1960s making them out of newly discovered thermoplastics, which could be stretched vertically on insertion and bounce into shape once inside the uterus. By funding various iterations and opening up the market, the Population Council kickstarted a design boom. There were coils shaped like leaves, Christmas trees, stingrays, lizard tongues and bowties. There were coils that stretched out in the uterus like accordions. Designers all aimed to achieve the same goal: a device that was large enough to be efficacious, in a shape that would prevent it being expelled by the uterus. A lesser concern was women’s comfort and safety, particularly given that coils were intended for women deemed unworthy of procreation. “Suppose one does develop an intra-uterine infection, and suppose she does end up with a hysterectomy,” gynaecologist Robert J. Wilson theorised at a 1962 conference sponsored by the Population Council. “How serious is that for the particular patient and

for the population of the world in general? Perhaps the individual patient is expendable in the general scheme of things, particularly if the infection she acquires is sterilising but not lethal.”

Wilson tempted fate. In 1971, the Dalkon Shield was released, a device with four or five spurs on each side that spoked outwards like crab legs – a design intended to prevent expulsion. In reality, the Shield’s claws embedded into the uterus, making removal extremely painful and even tearing out chunks of the uterus in the process, like a reverse vagina dentata. The biggest design flaw of the Dalkon Shield, however, was its multifilament tail strings, which allowed bacteria to gather between the filaments and travel up to the uterus, causing pelvic infections. “Doctors, who were generally unaware of or unconcerned about the potential dangers of these modern contraceptives, often dismissed women’s complaints about severe pain and bleeding as psychological and called them ‘normal’ side effects,” writes Takeshita. The resulting untreated pelvic infections left many women infertile, and in women who became pregnant with the Shield in place, induced life-threatening septic miscarriages. In the US, at least 15 women died and 200,000 women were injured.

Now that women are routinely screened for sexually transmitted diseases before insertions, the risk of pelvic infections is low, and liberating women from having to think regularly about contraception has earned the coil a feminist reputation. But we do not need to look far to see that using the coil to wield control over women’s bodies will always be a latent possibility. In June 2021, Britney Spears told a Los Angeles court that her 13-year conservatorship had prevented her from removing an IUD. “I wanted to take the IUD out, so I could start trying to have another baby, but this so-called team [her conservators] won’t let me to go the doctor to take it out because they don’t want me to have children,” Spears told the court. Meanwhile, in China, a number of reports have documented Uyghur Muslim women suffering forced coil insertions on the orders of the Chinese government – something the state denies. “I felt like I was no longer a normal woman,” Qelbinur Sedik, a member of the Uyghur community told *The New York Times*. “Like I was missing something.”

But concerns about consent and the coil aren’t confined to dictatorships or conservatorships. “There has been some evidence for several decades that

marginalised groups are more likely to be subject to contraceptive coercion and have their reproductive rights challenged,” says Annabel Sowemimo, co-director of Decolonising Contraception, an organisation that contributed to the June 2021 BPAS report. “This is historically bound up with perceptions that some groups, because of factors such as race, class or those living with a disability, cannot be good parents.” Medical professionals’ internalised stereotypes

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are compounded by NHS targets for LARC provision. “There’s always been that push, I think everywhere to try and get people on a LARC,” says one clinical provider. “It’s better for the NHS; it’ll save money; it’s better for the woman.”

In the UK’s National Institute for Health and Care (NICE) guidelines, LARC uptake is recommended for under 25s, people who have just given birth, and those who have had an abortion – groups who are particularly likely to want to avoid pregnancy. But providers need to ensure that women are given the chance to weigh up all contraceptive methods available to them. “I got the coil after an abortion, and I was basically made to feel like I had to get it because I couldn’t let that happen again,” one woman told me during an interview for this article. The coil’s practicality can quickly slip into paternalistic control, and presenting it as the only method a woman can be trusted with raises questions around who is considered worthy of exercising control over their own body and who is not.

Side effects of the coil and other contraceptives can ease after the first few months, and doctors often advise leaving a bit of time for a method to settle in. But BPAS also found that the cost of LARCs to the NHS, and the idea that a patient was too irresponsible for

¹ It is important to note that the issues I discuss surrounding coils do not only affect women: trans men, genderqueer and non-binary people may also be impacted, and their experiences should not be forgotten or erased. However, in this essay I am specifically focused on women, in part because the history of the coil that I discuss is bound up with society’s historic treatment and control of women, and in part because the scientific research I draw from was conducted on cisgender women.



other methods, had been weaponised to convince people to keep them in. One respondent with the contraceptive implant, a device that releases hormones into the arm, tried repeatedly to have it removed: “I became so distressed that I couldn’t get it removed even though I didn’t want it in my body anymore that my mum and I tried to cut it out ourselves.”

Aside from life-threatening infections, early coils also caused pain and bleeding, which led many women to have them removed or resist getting them inserted to begin with. As such, the Population Council realised that if coils were to become a contraceptive for the masses, they needed to get smaller. In the mid-1970s, the first coils using copper and hormones were released. Relying less on the uterus’s immune response for their contraceptive effect, these coils could have a smaller surface area, and adopted the T shape that is still the most widely used design today.

But was that T small enough? Although the coil’s surface area had massively decreased, T-shaped coils were still the same width as their predecessors. In the 1980s, Karl Kurz, a mechanic before he became a gynaecologist, invented the cavimeter, a probe which could gauge the width of a patient’s uterus before inserting the coil. A study of 509 women conducted using Kurz’s cavimeter found that the uterus was, on average, 24-26mm wide, yet all the coils on the market were 30mm or more. In response, Kurz initially customised coils for each patient’s uterus by cutting their arms to size, before inventing his own coil: the Flexi-T, a 23mm copper coil with bendy arms that curve inwards to avoid poking the uterus with any sharp edges.

A well-kept secret, however, is that the most widely used coils today are still larger than the average uterus. Research into the impact of oversized coils is sparse, but in the early 2000s the Israeli gynaecologist Ilam Baram used a camera to look inside the uteri of his patients who complained of pain and bleeding. Although nothing appeared to be wrong on ultrasound scans, the camera revealed that their coils were too large – the arms of the T shape were bent inwards or were embedded in the walls of the uterus. He also noticed that coils causing pain were often badly positioned, lying horizontally or poking into the fallopian tubes. To reduce these problems, Baram changed the coil’s size and shape, creating the first truly new design in

nearly half a century. Developed by FemTech startup Ocon in 2015, Baram’s IUB Ballerine was due to be released on the NHS in 2020, but its rollout was delayed due to the pandemic.

While other coils resemble torture devices, the Ballerine looks like a tiny, glittering solar-system diorama. Comprised of 17 copper balls threaded into a spherical shape, it doesn’t have any sharp edges. “Back in the day the uterus was looked at as a flat triangle,” says Daniela Schardinger, vice-president of marketing and medical affairs at Ocon. “But the uterus is not a flat triangle, it’s a cavity, and it’s constantly contracting.” The spherical shape of Ocon’s coil means that it is impossible for it to be awkwardly positioned. Its structure is made out of nitinol wire, an alloy of nickel and titanium which can be stretched vertically on insertion and then bounce into shape once in the uterus. Perhaps the best design feature of all, it comes in 12mm and 15mm sizes – by far the smallest available.

The Ballerine is a copper coil; a hormonal coil small enough for the average uterus has yet to be developed, although Ocon is working on it. In the mid-2000s, however, the German multinational pharmaceutical company Bayer released Skyla and Kyleena, two T-shaped hormonal coils which sound like they have their own reality TV show. Bayer’s designs are currently the smallest on the market, but, at 28mm, they are still too large. The size and shape of the coil remain a significant issue, and the fact that these physical discrepancies are not common knowledge prevents women from being able to push for better designs. There are ongoing lawsuits in the US against Teva Pharmaceutical Industries, for example, brought by women whose T-shaped coils snapped during removal, requiring surgery to gouge out the remnants. In the UK, the hormonal and copper coils typically prescribed remain too large, and even though four smaller copper models are available with comparable rates of efficacy and longevity, women are rarely given a choice of brands. In the US, every single coil on the market is too large.

Although adding hormones successfully reduced the size of the coil and increased its efficacy, it opened the door to other complications. In 2001, Bayer released the hormonal coil Mirena, which is also licensed as a therapeutic treatment for easing menstrual pain and bleeding. Bayer aggressively marketed their new product, partnering with *Mom Central*, a US-based

forum and blog for mothers, to sponsor “Mirena parties”, for which they sent nurses to tout the benefits of Mirena at get-togethers hosted by forum members. According to Bayer’s script, a nurse called Barb would kick off the evening by saying, “What we’re here to talk about today is how to find those simple ways to reconnect with ourselves and our partners.” She would then recommend Mirena as a means of fostering longed-for “spontaneous intimacy” by eliminating the awkwardness of both condoms and menstrual blood.

Meanwhile, blogs started to appear that threatened Mirena’s image. In 2008, an anonymous blogger started the *Life After Mirena* blog, where she revealed “the truth about the Mirena”. After getting her coil fitted in 2006, she started experiencing hormonal side effects. “My stomach appeared swollen, and my breasts were getting bigger, as if I were pregnant,” she wrote. “I was understandably freaked out and bought a pregnancy test, which came out negative.” She lost her libido and felt depressed. “I felt like it was my fault. My instinct told me that the Mirena was causing my weight gain, but I wanted to trust the doctor.” After she finally had her coil removed, she began to see some improvement, which is not surprising. Clinical trials found that Mirena caused hormonal side effects such as weight increase, breast pain, acne, decreased libido and depressed mood in 5 per cent or more of patients tested.

Comments validating these descriptions flooded in. “I feel so detached from life which means my two young boys aren’t getting what they need from me,” one commenter wrote. “I can’t stand my body, don’t EVEN want my husband near me,” another chimed in. In 2009, the FDA wrote a letter to Bayer admonishing the company for its dystopian Mirena parties and demanding that it change its promotional materials. Referring to Barb’s presentation, the FDA curtly wrote that it was “not aware of any evidence that suggests that women using Mirena for birth control experience an increase in reconnection, romance or intimacy with their partners.” In fact, the agency continued, the clinical data suggested the opposite.

On the blog, Mirena sufferers wrote that their doctors said hormones released directly into the uterus would not cause systemic effects. “No matter where you administer the hormones,” psychologist Sarah E. Hill writes in her groundbreaking book *This Is Your Brain on Birth Control*, “they all end up in the same place. And that place is everywhere.” In her book, Hill presents research suggesting that

hormones have an impact on our mate preferences, moods, sensitivity to smells, and our ability to learn and remember, amongst other key determinants of feeling like our real selves. Though Hill’s work focuses on the pill, a 2017 study by Erasmus University in Rotterdam showed that the hormonal coil heightens cortisol levels and speeds up the heart rate. “Women should be informed that the effects of an IUD aren’t just local, and a heightened stress response is partly caused by the effects of an IUD on the brain,” researcher Jurate Aleknavičiute said.

Waves of media attention about the hormonal side effects of Mirena show that even in recent years its hormonal impacts have been underplayed, with a subsequent increase in reports of adverse reactions to the device also implying that the frequency of side effects could be more common than indicated in clinical trials. A 2019 study published in *The British Journal of Clinical Pharmacology*, for instance, found that “frequencies could potentially be much higher than expected for some known or suspected AEs [adverse events] of Mirena such as of anxio-depressive disorders, sexual disorders, alopecia or headache.” Research into how birth control affects the brain is still in its infancy and other complaints women discuss online – such as the “Mirena Crash”, an abrupt hormonal imbalance caused by removing the coil – are yet to be studied.

Given these kinds of issues, the copper coil is often recommended as the preferred birth-control solution. It is non-hormonal, and therefore not believed to cause any mental-health side effects. Although it increases menstrual pain and bleeding (which is enough for many women to reject it), there are no other medically documented physical side effects. But as with Mirena, the internet has provided a space in which some women have raised concerns. A few months after Amy Hamilton-Daynes got the copper coil inserted in 2018, she started experiencing severe health problems. “I was really fatigued, I could barely walk or talk,” she says. “All my hair fell out in tufts, and my anxiety was through the roof, I couldn’t do anything without it being overwhelming.” She believes that the copper her coil was made from was responsible.

Copper poisoning from the coil was a topic of discussion on the Yahoo group *copperiuddetox* in the early 2000s, with women later migrating onto Facebook groups. The largest of these, *Copper IUD*

and Toxicity Support Group, now has more than 9,000 members. Schardinger says that Ocon has received emails about copper poisoning before. “It’s very hard to determine, because the release rate is so low that we do not necessarily believe it’s related to the coil,” she says. “But copper is also in food, so if it’s combined with a rich copper diet, it becomes a little bit less transparent.” Hamilton-Daynes has been a vegetarian since she was eight years old, and her favourite foods – such as chocolate, sweet potatoes and avocados – are all high in copper.

Scientific research on copper poisoning and the copper coil is extremely limited. Of the 12 studies that do exist assessing the blood-copper levels of women with the copper coil, a 2021 literature review by Lena Crandell and Natalie Mohler found that eight studies showed no increase, while four showed a significant increase. None of these studies, however, tested for free copper, the toxic form of copper, prompting Crandell and Mohler to raise “questions about the clinical significance of all research on this subject to date”. To complicate matters, measurements of free copper vary depending on the laboratory performing the tests and there is little consensus on what is considered a normal level.

Even though the copper coil is non-hormonal, natural hormones can still influence copper levels. Research from the 1950s onwards has shown that when the body experiences an increase in oestrogen, either during pregnancy or from taking the combined contraceptive pill, copper uptake in the blood is noticeably higher. Given that there is a broad range of what “normal” oestrogen levels are, it is conceivable that women with higher oestrogen levels could be more at risk of copper poisoning, alongside women with high copper diets, or women who inherited high copper levels. But the simple fact is that we have no idea. “For millennia, medicine has functioned on the assumption that male bodies can represent humanity as a whole,” Caroline Criado Perez writes in *Invisible Women*,² her 2019 book exploring the gender data gap, which sets out how women’s bodies and ailments are vastly underrepresented in medical research.

The lack of research into copper poisoning causes Hamilton-Daynes, who has a master’s degree in educational psychology and neuroscience, endless heartache and frustration. “I’ve always been someone

who lived in academia, so to live on fringe science is always going to be hard,” she says, “but you’ve just got to accept that, basically, women’s health is ignored.”

Unlike many of the problems linked to Mirena, copper poisoning has not been flagged in clinical trials. But women on Facebook are making similar claims regarding copper as women did on the Mirena blogs in relation to hormones: that copper from the coil can be absorbed into the blood in high enough levels to cause physical and psychological damage. On the Mirena blogs, women wrote that when they complained to doctors about their symptoms, they were recommended anxiety medication, an experience shared by Hamilton-Daynes. “It comes across as: are you sure you’re not going through women’s hysteria?” she says. “Should I just prescribe you a vibrator and send you on your way?”

When painful coil insertions were splashed across headlines in 2021, it was not news to me. The majority of coil-insertion stories I have heard resemble horror fiction: a friend who fainted, another who described it as “having your insides stapled”, and yet another who suffered such terrible cramps post-insertion that she had to be taken to A&E. It was surreal to see something that I found so familiar being treated as news and depressing to think that it had never occurred to me before to be angry about it. In July, however, the UK’s Faculty of Sexual and Reproductive Healthcare (FSRH) changed its guidelines to specify that women should always be offered pain relief during coil insertions. “It saddens me to read these reports,” wrote Jane Barter, FSRH’s vice president. “No woman should endure severe pain when having their IUD fitted.” I felt a sense of wonderment that something I had previously accepted as immutable could actually be changed.

The same is true for all contraceptives: we don’t have to like it or lump it; things can change if we kick up enough of a fuss. “A growing body of science is backing up what women have been telling their doctors for years: the pill changes us,” Hill writes in *This Is Your Brain on Birth Control*. Similarly, more research on the mental and physical impact of the coil is likely to reaffirm women’s lived experiences of hormones, metals and oversized coils. Dismissing women’s concerns about medical devices is likely to leave you on the wrong side of history: in recent years, large settlements were agreed for women suffering

² Reviewed by Kristina Rapacki in *Disegno* #23.

health problems from leaky breast implants, vaginal mesh and the Essure contraceptive device, all after years of fighting for recognition. In November 2019, for instance, more than 1,350 Australian women won a long-running class action lawsuit against Johnson & Johnson over the medical risks of its vaginal mesh implant products. “They have treated women essentially like guinea pigs,” said Julie Davis, the original claimant in the case, “lied about it and done nothing to help.” One month prior to this, the company had agreed to pay nearly US\$117m to resolve claims over its pelvic mesh products in the US.

Critiquing birth control, however, is a contentious business. A 2019 article in *The European Journal of Contraception & Reproductive Health Care* argued that journalists should be careful to avoid whipping up contraceptive health scares. “The stated rationale is usually public concern,” wrote the author, who has worked for a number of pharmaceutical companies, “but this neglects the public health imperative to balance small risks against potentially greater benefits.” Yet the mental and physical impact of birth control is as important a public-health issue as the rate of unintended pregnancies; believing otherwise risks prioritising the societal impact of women’s fertility over women themselves. We should ask ourselves: does the way we currently balance the “public health imperative” ultimately serve the taxpayer more than it serves women?

Many of the risks I have detailed around the coil in this article are probably small, but accurate data collection on women’s experiences of birth control is nevertheless essential. I also do not believe that informing women of side effects will necessarily make them abandon contraception – after all, I have the Mirena coil. Despite knowing so much about its potential side effects that it has given me nightmares, I am not reaching for my coil strings in a panic. Like many women, I have accepted Mirena as an imperfect solution and am thankful for the protection it gives me. But I deserve better than a device that is too large for my body and whose impact on my health is unclear. And although I have not experienced intolerable or life-ruining side effects, those who have done should not be left to advocate for themselves alone. Fighting this fight means interrogating what beliefs we have unconsciously digested about what women deserve and what benefits society. “Somewhere, somehow, we’ve all agreed that it’s okay for ourselves and for other women to live with

mental health problems, as long as no one is getting pregnant unexpectedly,” Hill explains. “This is – quite literally – complete insanity.” END