Reclaiming the Cycle
Examining Tech's Responsibility to Build Ethical Tools for Women's Health

Emily Sen, Duke University AM Candidate 2021, Bioethics and Science Policy

Sam sat on her couch holding her phone in one hand and balancing a tea mug on her pregnant belly with the other. As she scrolled through her daily news feed, a headline caught her eye. She stopped. Her whole body contracted. In a flurry of confusion, she opened an article to learn that the period tracking app she had been using, Flo, was just accused of compromising its users' privacy. The Federal Trade Commission (FTC), the agency in charge of protecting consumers from unfair and deceptive business practices, alleged that Flo was sharing personal data with third-party companies, including Google and Facebook (McShane, 2021). Sam couldn't believe it. But she found another article, and another. "How could this happen?" she wondered. Sam chose Flo because the app claimed to be private and secure. She trusted it. Every day for over a year she entered intimate information about her menstrual cycle, sexual activity, fertility treatments, appetite, exercise, and medications. She felt betrayed and decided to delete the app. Even still, she knew she would eventually download something else because she wanted more kids, and her fertility tracking app had been indispensable the first time. Getting pregnant was hard for Sam, and Flo helped her take control of her pregnancy. She didn't realize the app was also taking advantage of her (McShane, 2021). [i]

Unfortunately, Sam's experience is not unique. Today, millions of women worldwide use period and pregnancy tracking apps to manage their reproductive health—Flo alone boasts over 100 million users (Gupta and Singer, 2021). Women use these apps to help them get pregnant, to avoid getting pregnant, or to simply prepare for their next cycle. Since the mid 2010s, companies have invested billions of dollars into menstruation, fertility, and sexual wellness apps. This rapidly growing market within health technology—often referred to as "femtech"—is poised to reach a value of $50 billion by 2025 (Gupta and Singer, 2021). After years of neglect within medicine, women are rushing to take advantage of these technologies, and the dizzying growth of the femtech market indicates that there is still significant unmet demand. While reproductive health apps promise to empower women and have the potential to advance women's health, it's unclear whether they are doing women a service or simply exploiting them in a new way. After considering the context in which femtech apps exist, this article will use the feminist ethics framework to consider how these tools currently operate—including various privacy concerns, their use in the workplace, and design and accuracy issues—and will conclude by exploring the immense potential of these technologies.

Throughout the history of medical research, the male body has been depicted as "superior and the template against which bodies are judged" (Jackson, 2019). It is only recently that women have gained representation in research, clinical trials, and even biology textbooks (Gupta and Singer, 2021). In 1993, for example, the National Institutes of Health (NIH) acknowledged the male bias in healthcare by mandating the inclusion of women in clinical trials (Jackson, 2019). But nearly three decades later, the gap persists. Currently, only 4 percent of federal research

and development funding in healthcare is directed toward women's health, and doctors still have questions about how disease and medications work in the female body (Das, 2018). Women not only *want* more control of their health—they *need* it to attain leadership positions and professional opportunities. To illustrate, the advent of birth control in the 1960s allowed women to decide when and if they wanted to give birth, thus giving them more freedom to participate in activities other than childrearing. This newfound liberty gave rise to the "second wave of feminism" in the 1960s through the 80s (Keohane, 2020). In 2014, *Bloomberg Businessweek* hailed contraception as one of the most influential catalysts in the business sector within at least 85 years (Soller, 2014). Nevertheless, significant gaps in leadership and pay equity persist, along with barriers to family planning (World Economic Forum, 2021). Women should have equal access and opportunity to pursue leadership positions if they choose. While femtech apps seem to support the rise of women's professional and social empowerment, not all fill this promise (Tiffany, 2018). Because femtech companies rely on the production and analysis of data for financial solvency, many apps seem to cater to the needs of marketers, medical companies, and employers rather than women (Felizi and Varon, 2018).

Data collection is central to the viability of most femtech apps—and most tech apps in general. Data helps apps improve their product design and function, and it is also their primary means of making money. Companies share their users' data with digital advertisers and marketing firms who use it to target consumers with personalized ads. These third-party actors—which include companies like Facebook, Google, and various marketing and analytics firms—have relationships with data brokers who comb the internet gathering and purchasing personal information about individuals from multiple sources to create detailed user profiles (Rosato, 2020). Once this information moves beyond data brokers' hands, it's difficult for even data experts to track where it ends up—not to mention the average consumer. A study published in 2020 by a Norwegian advocacy group examined 10 apps that handle intimate personal information, including period tracking and dating apps, and traced where their data traveled. They found that personal information was shared with *at least* 135 companies (Rosato, 2020). While this data is typically de-identified, or stripped of markers that are unique to individual users, it can easily be traced back to specific individuals by combining it with various pieces of information—like users' location, contacts, or other distinctive identifiers on their phones (Rosato, 2020). The data collected by femtech applications is especially valuable to marketers given how uniquely profitable pregnancy is for retailers. Deborah Peel, an ardent advocate for health privacy rights, explains, "knowing that someone is preparing to become a parent means knowing that someone is about to enter one of the very few life stages in which they're likely to get 'hooked on new brands'" (Peterson, 2016). Consequently, market forces create strong incentives for women's health apps to push privacy boundaries in sharing users' personal information.

Femtech apps' priorities need to change. It is important that technologists and companies creating femtech products respect their users and consider their ethical duty to women. A woman's reproductive health is central to her autonomy, identity development, and dignity; therefore, it is paramount that tools claiming to help her care for her health are thoughtfully and ethically designed. The lens of feminist ethics is useful in this context. In contrast to

traditional moral philosophies, feminist ethics emphasizes the importance of care and relationships. It also embraces the fact that moral agents are emotional, sentient beings, by requiring careful consideration of context, relationships, obligations, and power dynamics in ethical deliberation (Lindemann, 2019). Furthermore, the feminist ethics framework requires moral actors to consider how traditionally female labor roles—like caring for children, the elderly, and the home—affect ethical considerations (Lindemann, 2019). If tech companies don't account for these elements in the design and implementation of their products, they stand to reproduce society's historical tendency to ignore women's health and undervalue their traditional roles as caregivers. The feminist framework ought to be applied broadly across technology to account for users' diverse circumstances. However, it is especially important in femtech because women's need for these products is directly related to historical and contextual factors, and these companies are handling tremendously personal information.

Menstrual tracking apps ask users to reveal massive quantities of sensitive information. Women document the color and consistency of their flow; what they ate, drank or smoked; whether they had sex—even if they orgasmed (Felizi and Varon, 2018). Women share details that many wouldn't feel comfortable mentioning to even their closest friends, and in return, they receive important health information. Women then use this information to guide health and lifestyle choices such as contraception, sex, diet, and selfcare. Thus, period and pregnancy tracking apps handle data that spans all three domains of privacy: physical, informational, and decisional (Sax, 2018). For many women, this trade-off feels worthwhile because menstrual tracking apps are often integral in helping them care for their health. When a woman downloads a menstrual tracking app, she is essentially entering an intimate relationship with her device. In so doing, she trusts the people behind the screen to keep her information safe and private.

Concerningly, a number of tech companies have failed in this obligation. Most recently in 2019, the *Wall Street Journal* reported that the period tracking app, Flo, had been sharing users' personal information with marketing and analytics companies, like Facebook and Google, since 2016 (Schechner and Secada, 2019). This is despite the fact that between 2017 and 2019 Flo's privacy policy promised users it wouldn't share "information regarding your marked cycles, pregnancy, symptoms, notes and other information that is entered by you and that you do not elect to share" (McShane, 2021). The FTC filed a complaint against Flo in January 2021, claiming the company misled its users. Flo quietly settled the charges without admitting any wrongdoing, and the proposed consent order was published in the Federal Register for public comment. Although the comment period ended on March 1, 2021, the FTC has not yet announced whether it will finalize the proposed consent order (FTC, 2021). Nevertheless, since journalists made the company's privacy violations public, Flo has cracked down on its data sharing policies. But it may be too late to regain users' trust (Rosato, 2020). Women like Sam have decided to desert the app, feeling "disturbed" and "violated" (FTC, 2021). Even still, Flo isn't the only company struggling to safeguard its users' privacy. In recent years, reporters and watchdog organizations have identified at least six other companies who have left users' information vulnerable or shared it with entities like employers or advertisers without users' clear consent (McShane, 2021). This pattern of sloppy data stewardship cultivates women's

mistrust of femtech apps and prevents them from reaping the health benefits these products could offer.

Unfortunately, these infringements of women's privacy are likely to continue as long as consumer health apps remain largely unregulated. Many Americans assume that information shared on their health apps is protected by federal law (Morrison, 2021). This is because, in the United States, the Health Insurance Portability and Accountability Act (HIPAA) limits providers' ability to disclose patient health information; consequently, most interactions Americans have with the medical system are covered by HIPAA (Rosato, 2020). But this law only applies to "covered entities" such as healthcare providers, hospitals, pharmacies, labs, and insurers. It does not apply to health apps unless they are operated by a healthcare provider or a business associate of a covered entity (Rosato, 2020). Currently, femtech apps are businesses regulated by the FTC. While the FTC can file a complaint against companies who break their privacy promises, this is not enough to regain users' trust and protect their privacy (Gupta and Singer, 2021).

The common assumption that feminine health apps are covered by HIPAA reveals the need for a comprehensive privacy law that applies to health data (Morrison, 2021). As a guardian of the public good, the government has an ethical duty to protect this information. The unrestricted dissemination of an individual's personal health information can affect their ability to obtain life insurance, increase the interest rates they are charged on loans, and even lead to discrimination (Rosato, 2020). Realizing these potential harms, a number of government officials have proposed laws to protect the users of health apps. In June 2019, the Protecting Personal Health Data Act was introduced in the US Senate. This bipartisan effort would require mobile health technologies like health and fitness trackers to allow customers to access, alter, and delete the health data these products collect. But this legislation has not yet passed (Rosato, 2020). In the US, data stored on consumer health apps is only protected in select regions by state-specific laws. The need for federal regulation looms large, particularly because the market works to prioritize profit, not people.

Some period and pregnancy tracking apps have grown their businesses by working directly with employers and insurers to incorporate their product into corporate wellness programs. However, this lucrative pairing seems to ignore the history of discrimination against women in the workplace. While federal law protects pregnant women from discrimination at work and requires that pregnancy-related costs are covered in the same way as other medical costs, proving discrimination can be difficult (Harwell, 2019). These laws also don't protect women against discrimination based on other sensitive information shared on these platforms such as their plans to get pregnant (Tufekci, 2016). Even if women feel hesitant to share their personal information with a company-sponsored app, it can be hard to say "no." The inherent power differential in the employer-employee relationship often makes participating in corporate wellness programs—which include femtech apps—feel like less of a choice than an obligation. Many companies also offer financial incentives specifically for menstrual tracking apps (Harwell, 2019). But using these services also comes at a cost to employees. Femtech apps can expose troves of sensitive information to users' bosses. Take Ovia for example. For a fee, employers

can offer their workers a special version of the Ovia app as part of their corporate wellness programs. The app then grants employers access to aggregate data on topics including: how many of their workers faced high-risk pregnancies; the average time it took them to get pregnant; what medical questions they were researching; what articles they were reading; and when they planned to return to work (Harwell, 2019). To ensure personal data is kept private, Ovia shares information with employers in a de-identified, aggregated format. But in many workplaces, only a handful of women are pregnant at a given time, making it especially easy to re-identify information. Experts worry that employers and insurers might abuse information gathered from apps like Ovia by using their analytics to increase the cost of corporate health insurance plans or scale back benefits (Harwell, 2019).

Nevertheless, the companies that that sign contracts with femtech apps insist they have workers' wellbeing in mind. Ovia, for example, alleges that women who used their platform showed a 30 percent decrease in premature births and a 30 percent increase in natural conception. While the app rakes in contracts with its fun, approachable interface, the real selling point seems to be dollars saved by employers and insurers (Harwell, 2019). By helping women conceive naturally and avoid pregnancy complications, menstrual tracking apps promise to eliminate hours of lost productivity from doctor appointments and fertility treatments, as well as pricey stays in the intensive care unit (Harwell, 2019). Moreover, Ovia's website boasts that its product offers a 4 to 1 return on investment. It does not, however, explain where these savings come from or how the company made this determination (Ovia Health). While saving costs is a great ancillary benefit, this shouldn't be the main goal of cycle tracking apps. But it seems like many femtech apps have lost sight of their users.

Most femtech apps are crafted for a specific type of woman—one who is straight, sexually active, partnered, fertile, and middle class (Tiffany, 2018). Their interfaces are crowded with bubbly pink letters and inspirational messages that reinforce stereotypical ideas about femininity and trivialize the importance of reproductive health. While some women identify with traditional notions of femininity, many don't. Some women simply want a no-frills app to help them track their cycle, but there are few options like this on the market. Rather than filling their ethical duty to care for women's relationships and wellbeing, these design tactics erase valid female identities (Delano, 2015). Moreover, some platforms cannot accommodate "irregular" menstrual cycles, abortions, or non-heteronormative sexual orientations (Tiffany, 2018). Journalist Maggie Delano decided to try the menstrual tracking app Glow. She wasn't looking to get pregnant or avoid pregnancy, but her cycle had become irregular. She wanted more accurate information to report to her doctor and was interested in monitoring her mood in relation to her cycle. But Glow didn't work for her. First, when it asked her to "choose her journey," the options included: "avoiding pregnancy," "trying to conceive," and "fertility treatments." None of these applied. Later, she tried to enter the length of her cycle, but Glow couldn't accommodate a cycle as short as hers—there were no options shorter than 22 days (Delano, 2015). Women use femtech apps for many reasons. Some want to get pregnant or avoid getting pregnant, some want to track their menstrual-cycle-related health problems, and some want to learn more about their bodies (Rosado, 2020). For Maggie, period tracking apps are "yet another example of technology telling queer, unpartnered, infertile, and/or women

uninterested in procreating that they aren't even women" (Delano, 2015). The fact of the matter is that women often adapt to their app rather than the other way around.

Because femtech apps are often the most accessible resource for reproductive health information, millions of women turn to their phones for information and advice when making important health decisions. However, a study published in the journal *Obstetrics and Gynecology* found that most period and pregnancy tracking apps are inaccurate and contain misleading information. Many offered heath information without citing scientific literature, and some even shared objectively false information (Moglia et al., 2016). It's important to note that this study was published five years ago in 2016, and scientific and technological advancements have helped improve the quality of many femtech apps. Even still, it remains difficult for users to parse out which apps are legitimate, and which are not. The US Food and Drug Administration (FDA) is the federal agency typically responsible for helping the public navigate which health products are safe and effective. But the FDA only regulates official "medical devices" and most femtech apps don't qualify as such (Center for Devices and Radiological Health). To date, only one app has FDA permission to market itself as contraception (Bateson, 2019). But even with FDA approval, poor health literacy among the general public raises concerns regarding how much women should expect out of even the FDA-approved apps.

Natural Cycles is the Swedish-born app that made headlines in 2017 as a "digital contraceptive" (Sudjic, 2018). The app was so effective at tracking female fertility that the FDA approved it as "the first mobile medical application (app) that can be used as a method of contraception to prevent pregnancy" (FDA, 2018). Natural Cycles' algorithm uses a woman's daily body temperature measurements and menstrual cycle information to determine how fertile she is on any given day (FDA, 2018). Every morning, Natural Cycles users wake up, take their temperature with a special thermometer, input the reading into the app, and find out if they can have care-free, unprotected sex without getting pregnant (Sudjic, 2018). The product boasts an impressive 93 percent efficacy rate—better than a condom and not much worse than the pill (FDA, 2018; Guttmatcher, 2020). While this natural contraceptive method can be effective, it requires close daily monitoring and data entry. It also requires women to abstain from unprotected sex for a few days each month (Anderson, 2018). This method can be confusing, creating plenty of room for user error. Consequently, the 7 percent of women who inadvertently get pregnant often feel ashamed and baffled. Amy, a 29-year-old Natural Cycles user shared, "you're told all you need to know is yourself. I believed in it the same way I did the pill and thought I did everything right" (Sudjic, 2018). But she still got pregnant. One key concern with "digital contraceptives," is that a woman can begin using an app as her sole form of contraception without consulting her doctor. But some women—those with irregular periods or ovarian cysts, for instance—are bad candidates for the product (Sudjic, 2018). In medicine, treatments are tailored to patients' personal needs and closely monitored by trained professionals. This way, people are informed of their risks and have someone to turn to if things go wrong. Femtech apps don't offer the same support.

But the concerns associated with femtech apps shouldn't necessarily dissuade companies from developing new technologies. Instead, this market's extraordinary promise should motivate

technologists to build better, more ethical products. In a world where even people without clean drinking water often have smartphones, apps have the potential to fill critical healthcare gaps. For example, women living in cultures that prohibit them from seeking advice about topics such as sex, birth control, or fertility could find care through their phones (Das, 2018). Femtech apps also have the potential to lower women's healthcare costs. Fewer women currently have health insurance than men, and they are often charged higher rates for insurance plans (Das, 2018). Femtech apps allow women to manage their health without worrying about the steep costs of doctor visits and offer cheaper alternatives for care. For example, a woman trying to conceive can buy an Ava fertility bracelet for $249, which comes with a free companion app. Fertility treatment, on the other hand, costs around $11,000 (Das, 2018). While these are fundamentally different services, Ava lets women try an affordable, low-risk option before investing in the expensive treatment. Of course, users can only reap these benefits if femtech apps are tactfully designed with the intention of advancing women's health. Apps should make the extra effort to teach women about their personal health rather than expecting them to accept algorithmic advice on blind faith. And users should be able to benefit from these products without exposing themselves to risks.

The first step in advancing this goal is using femtech apps to help women—not to sell them things. At a minimum, products sold to women should be designed not to harm them. Ideally, however, the large data sets gathered from period and pregnancy tracking apps could be used to help answer neglected scientific questions about how the female body processes drugs, medical treatments, and diseases differently than the male body (Das, 2018). These insights could then be used to lower women's burden of disease and revolutionize women's health. As ethical stewards of women's data, tech companies have an obligation to earnestly try to use their data to these ends. Nevertheless, researchers note concern about the "lack of general clinical applicability and focus on variables that affect time out of work and insurance utilization" (Harwell, 2019). Data is not neutral. Karen Levy, an assistant professor of data science at Cornell University explains, "every technology of measurement and classification legitimates certain forms of knowledge and experience, while rendering others invisible" (Levy, 2015). While experts agree that reproductive health apps' data sets *could* be valuable, quantity alone isn't enough. Researchers need to understand and control for factors like participants' demographics, selection bias, context, and consent. To ethically optimize this process, companies and data scientists need to recognize their users as people and appreciate their lived experiences. Apps should seek information from women from diverse backgrounds about what they want from the app and how they use such products.

This may be an ambitious goal, but at least one company has proven it's possible. Clue is a cycle-tracking app founded in Germany by Ida Tin. As a woman, Tin wanted to understand her body and use that information to help manage her health. She wanted a tool that was scientifically sound but noticed that most of the options on the market were little more than pink calendars that sent an alert every 28 days (Collins, 2019). She couldn't find what she needed, so she decided to build it herself. She carefully crafted a product that catered to her needs and those of other women—no frills, just facts. Tin describes, "throughout our journey, we've been very clear that, strategically, we need to care about the user base, and growing the

user base, and maturing the product" (Collins, 2019). Caring for users means providing them with the best scientific information possible, encouraging them to discuss concerns with their physician, and protecting their privacy. Users don't need to create an account to use Clue. When a woman elects to use the app without creating an account, all the information she shares is stored only on her device, and Clue does not have access to that data (Felizi and Varon, 2018). If a user does create an account, she can opt out of sharing her data with Clue, and if she chooses to share her data, she can go back and delete it at any time. Clue shares de-identified information with scientific institutions on a strictly non-commercial basis, and the company practices good stewardship by publishing the results of scientific studies that use its data (Gupta and Singer, 2021).

While Clue is a profit-seeking company, it is mindful of the tradeoffs that accompany monetary gains. In the app's first years, it survived exclusively off the over $30 million raised in investor funding and focused its attention on perfecting the app's services (Collins, 2019). After considering various business models, the company eventually decided on a subscription model for premium services to avoid unforeseen threats to users' privacy (MacKenzie, 2018). While users enjoy more privacy protection with Clue than they do with other apps, they should be aware that these protections aren't perfect. The benefits of sharing data with Clue (e.g., research or sending information to a doctor) will necessarily come with privacy trade-offs (Collins, 2019). Women must decide what risks they are willing to take, what services they expect in return, and ultimately, who they trust with their data. As for the femtech market, Tin believes their responsibility is to, "restore faith that there can be good technology companies working with data—intimate private data—for the benefit of the users and not to make billions. It can be done" (MacKenzie, 2018).

Femtech apps deal with one of the defining aspects of womanhood—reproductive health. Throughout history, a woman's ability to control her reproductive health has been associated with increased educational, financial, and professional opportunities (Keohane, 2020). But there are still major gaps in scientific understanding of women's health—and technology can help. Femtech has the ability to support women across the globe in taking charge of their health, but if companies in this market are not careful, they could inadvertently do more harm than good. Femtech companies must understand the specific needs of the women using their products and incorporate a range of female voices into their product design. Moreover, both companies and government regulators must take their duty as responsible stewards of women's intimate, sensitive information seriously. They must protect intimate data with laws and policies that ensure it is used to help women rather than simply turn a profit. Women have been caring for others for centuries. But they need to care for themselves too. A woman deserves to understand her body and control her health. Because along with this comes the ability to control her future.

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[i] Sam's story was based on the experience of Kat Grilli, as described in Julianne McShane's article in *The Lily*. While the events are true, creative liberties were taken with contextual details.