

Algorithms used in FemTech: An Exploration of What Lies Undercover.

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Abstract

This research applies a Feminist Technoscience analysis to the impact of algorithms in the FemTech sector, focusing on reproductive healthcare. Through analysis of two case studies, this research reveals contradictions between the perceived empowerment of FemTech and the values embedded in algorithmic software used in reproductive healthcare. The case studies explore how algorithms can control and surveil access to reproductive health medications, driven by profit accumulation and the tractability of bodies — where quantifying the body into mathematical algorithms enables control through prediction and management of behaviours. The research combines two semi-structured interviews and literature in Feminist Technoscience to reveal these forms of control and surveillance. This study emphasises the importance of uncovering the hidden application of Algorithmic Governmentality in FemTech, concealed by a benevolent framing of empowerment, and suppression of critical information through algorithmic content moderation. The case studies are analysed through multiple lenses, considering the power dynamics of Surveillance Capitalism, gendered biases of technology from a Feminist Technoscience perspective, and broader social implications of algorithms from a Post-Colonial viewpoint. The research concludes that financial gain in algorithmic development reinforces masculine power structures and perpetuates extractive practices rooted in colonial history, impacting the governance of bodies which extend beyond the case studies to the wider realm of FemTech innovations. Limitations of the study can be identified as having an incomplete understanding of the technical operation of algorithms.

Keywords: Surveillance Capitalism - FemTech - Feminist Technoscience - Silicon Values - Algorithmic Governmentality

Algorithms used in FemTech: An Exploration of What Lies Undercover

From the first rubber ‘sanitary bloomers’ to silent electric breast pumps, products targeted at the ‘female body’ have occupied an advancing market since the first ‘female health products’ came onto the European and North American markets in 1890 (Burt-D’Agnillo, 2022, p.17). By 2023, this market has expanded to hundreds of companies developing products, services and software available to track, remedy, and ease female health, a market named “FemTech” — short for Female Technology (The Dawn of the FemTech Revolution, 2022). Just 14 years after the concept was coined by Ida Tan, founder of the most used mobile application (app) for tracking the menstrual cycle, this subset of health technology is expected to be worth \$103 billion by 2030 (Global Femtech Market Size 2030 | Statista, 2023). Along with financial success, the emergence of FemTech has received praise as being an empowering tool to better understand the ‘female body’, as many apps and devices marketed as FemTech enhance self-knowledge through increased information on how the body functions, and through the quantification of bodily functions, making internal processes like menstruation, fertility, and menopause visible through tracking them digitally (The Dawn of the FemTech Revolution, 2022). As well as using apps to track internal bodily processes, the digitalisation of reproductive health allows users of FemTech to digitally and remotely access information and services regarding reproductive health, increasing the options for self-managed healthcare without the intervention of a doctor or physician (Yoldemir, 2022).

While enhanced knowledge of the personal experiences of how the body functions through apps, devices, and websites can be understood as empowering, the data needed to program these apps, the labour needed to test these devices, and the algorithms needed to administer these websites, reveal contradictions to the framing of empowerment associated with FemTech (Hendyl & Jansky, 2022). The contradictions that this research will outline can be understood by the word ‘benevolent’, where the aim or act of benefitting and empowering bodies works as a pretence for building trust in a new form of control and governance.

When studying FemTech and the implications the framing of empowerment has on embodied empowerment, some of the contradictions that I will discuss in this research have been informed by scholars of Feminist Technoscience. Specifically, the *International Journal of Feminist Technoscience* and *Catalyst | Feminism, Technology and Technoscience* publish research on the socio-historical conditions of reproductive choice, the corporate profitability of contraceptive methods, and the empowerment and disempowerment of implementing FemTech products in improving female health, with most of their research based in North America and Northern Europe (Åsberg & Lykke, 2010, p.300). Building on these scholars' work, this research examines how FemTech and Surveillance Capitalism intersect to assert governance over bodies targeted by FemTech software, particularly exploring the work of algorithms in what Jennifer Cobbe calls "Algorithmic Governmentality" (2020, p.745). When referring to governance over bodies, Algorithmic Governmentality concerns the procedures and tactics in place through the use of algorithms to change the behaviour of bodies in pursuit of desired outcomes (Cobbe, 2020, p.746). Central to this form of governance is Surveillance Capitalism and the values which emerge from Silicon Valley, the global centre for high technology and innovation in the United States of America (USA), discussed by Jillian York in her book, *Silicon Values* (2022, p.151). The term 'Silicon Values' refers to the implicit biases, assumptions, and dominant ideologies that permeate a form of governmentality that reflects the perspectives and interests of the predominantly male, Western, and profit-driven tech industry (York, 2022).

With FemTech often marketed as empowering in promoting the right to decide over one's own body, this research reveals the contradictions between the benevolent framing of empowerment, and the instances where algorithms reinforce 'Silicon Values' of masculinity and 'profit over people' onto the targeted bodies who consume the goods, services, and software of FemTech. By recognising and interrogating 'Silicon Values', a Feminist Techno-science approach

aims to challenge and transform the existing power dynamics that underlie the creation and use of FemTech as a health technology.

The research question guiding this research is: What values are revealed when exploring the use of algorithms in FemTech? Answering subquestions: what is the relationship between Surveillance Capitalism and Algorithmic Governmentality in FemTech? and, What are the broader social implications of using algorithms to promote and suppress information on reproductive health?

Positionality

FemTech as an acronym for '*Female* Technology' centralises the 'female' experience of the body, supported by Ida Tan disclosing the target audience of FemTech as people who identify as 'female' (Goldhill, 2019). With a centralised 'female' body, FemTech as a market has been critiqued to confine a significant portion of the population into a niche subgroup that has a series of 'female' body-specific needs (Ibid). The distinction between 'Fem'-Tech and 'Tech' implies a differential between a gender-binary audience which sustains a patriarchal view of bodies (Harcourt et. al, 2015, p.293). This generalisation or simplification, "grounded in exclusionary ontologies, normative femininity, epistemic injustice, and heterosexist notions of female sexuality" (Hendl & Jansky, 2022), reinforces normative binary understandings of sex and gender that have been socially constructed through the repetition of gendered performance (Butler, 1988, p.522). FemTech, by this understanding, enhances empowerment over bodies that conform to the 'female' gender, while excluding trans-men, non-binary, and intersex people. Conscious of this, I choose to use the terminology 'targeted bodies' throughout this research to refer to the primary target group and intended consumers of FemTech, accommodating a fluid and non-categorical identification of gender. As such, the bodies targeted in the cases I will outline are those who can take the oral contraceptive pill (taking *Oestrogen* and *Progesterone*) to regulate their menstrual cycle or the abortion pill (taking *Mifepristone* and *Misoprostol*) to terminate a pregnancy.

Exploring Different Definitions of "The Pill"

This research will explore two cases in which reproductive health — health that relates to the capability of the body to reproduce, and to bodily functions and processes (World Health Organization, 2018) — is supported by FemTech innovation. Both instances address reproductive health in unique ways by addressing two definitions of ‘the Pill’.

To “just get on the Pill” is a colloquial reference to taking the oral contraceptive pill (Littlejohn, 2021), a Western cultural expectation for some when sexually active and avoiding pregnancy (Gabriels, 2023, p. 23). The contraceptive pill is a medication which can be taken orally, containing both, or either, oestrogen and progesterone to regulate the menstrual cycle and prevent pregnancy (World Health Organization, 2020). The contraceptive pill is produced in various doses and has been prescribed to those who can afford it and who live in sociopolitical environments where it is accessible and legal for nearly seventy years (Blair, 2023, p.21). Initially developed in 1957 as a method to prevent neurodivergent and homosexual people from reproducing, it received approval from the American Food and Drug Administration (FDA) in 1960 as a contraceptive method (Preciado, 2013, p.28). In 2023, while illegal in parts of the world, the contraceptive pill is widely distributed as a reliable and effective form of contraception. Common forms of the contraceptive pill do come with health risks, with the development of a serious blood clot being a risk for “three to nine out of 10,000 each year (and 327 million people are taking hormonal birth control worldwide).” (Blair, 2023, p. 23). Blair continues to state that the contraceptive pill “as we know it” is “riskier than any of the COVID-19 vaccines” (Ibid). Despite this, the chemical components in the contraceptive pill rank as the most widely used pharmaceutical molecules in history (Preciado, 2013, p.28).

Another exploration of “the Pill” is the abortion pill, which is a medication used to terminate a pregnancy without the use of surgical methods. In this way, a pregnant person can terminate their pregnancy by taking Mifepristone tablets, or a combination with Misoprostol tablets depending on

the pregnancy stage (Women on Web, 2023). Both Mifepristone and Misoprostol have been on the market in France since the 1980s, have been FDA approved since 2000, and have been listed by the World Health Organisation (WHO) as an essential medicine as of 2021 (World Health Organization, *WHO model list of essential medicines*). The distribution and consumption of these medications as ‘abortion pills’ have been limited to legislative, religious, and social restrictions per country, with ongoing public debate perpetuating the reproductive justice landscape (Roy & Thompson, 1992, p. 9). A recent development in this debate is the overturning of the constitutional right to have an abortion in the USA, the landmark decision made in 1973 protecting the right to abortion by the case of *Roe v. Wade* (Supreme Court Case: *Dobbs v. Jackson*, 2023). This event marks a pivotal moment in history, representing a rightwing, “anti-choice”, also known as “pro-life”, view on abortion access in the USA (Ibid). As identified by the WHO, “the lack of access to safe, timely, affordable and respectful abortion care is a critical public health and human rights issue” (2021).

In the time that the contraceptive pill and abortion pills were emerging in the North American and North European pharmaceutical industries of the 1960s and 1970s, capitalism was dominating the socio-economic structure of the global North (Preciado, 2013, p. 25). New capitalist modes of production commercialised and privatised public goods such as education and healthcare, increasing competition among private businesses which stimulated greater circulation of wealth and exponential growth in globalisation and standardisation through the free market (Barnard & Spencer, 2002. p. 720). During this time of wealth accumulation, new technologies were being explored, with computers and the internet becoming technologies that were accessible to the general public of the global North (Wyatt, 2008, p.114). Computer programmers quickly developed machinery that could perform simple, administrative tasks to being able to complete more complex functions, working faster and cheaper than the clerical workers employed at the time (Hayles, 2005, p. 1-2). Jumping forward to 2023, computer technology has evolved from automating human tasks to creating human-like intelligence, a transition that is rapidly advancing with the emergence of

Artificial Intelligence (AI), an industry that is projected to contribute up to \$15.7 trillion to the global economy by 2030 (PricewaterhouseCoopers, 2017). With the growth of this industry, the adoption of AI and algorithms in the development of FemTech software is also reportedly increasing (The Dawn of the FemTech Revolution, 2022).

Case Studies

To be able to explore the contradictions between the perceived empowerment of FemTech and the values embedded in algorithmic software I will look at two cases of FemTech.

The first FemTech case focuses on TailorAid, a for-profit start-up founded in 2022 by three Emlyon Business School alumni, based in France (Tailoraid - When Students Bring AI-Driven Healthcare Solutions to Patients and Doctors, 2022). The start-up, at the time of this research, is developing an algorithm in precision medicine which can predict the side effects of various contraceptive pills, tailored to a patient's profile of biomarkers (age, sex, weight, height...). This way, patients can avoid taking a dosage of the contraceptive pill that will negatively impact their physical and mental health. The software works as a tool for doctors to use to have a clearer overview of the possible side-effects that patients might experience based on an output that analyses the patients' biometric data. The software compares the patient's biomarkers to those of other patients who have reported experiences with the same contraceptive pill. TailorAid's algorithm is categorised as FemTech software as it directly targets menstrual health, catering to specific needs regarding the ingestion of medication which regulates the menstrual cycle, aligning with the specific purpose and target group of FemTech (*The dawn of the FemTech revolution*, 2022).

The second case study to be examined is Women on Web (WoW), a non-profit organisation that supports pregnant people worldwide to medically terminate unrequited pregnancies. The organisation was founded in 2005 by Dutch artist, activist, and physician, Rebecca Gomperts. The organisation has helped over 116,000 people access abortions since 2005 and has helped over 1 million people in responding to online consultations (Who We Are, 2023). Utilising the Internet to

connect pregnant people with the WoW help desk provides remote support and guidance using telemedicine. This digital service makes use of the Internet and directly relates and caters to the reproductive health of pregnant people, making it identifiable as FemTech (The Dawn of the FemTech Revolution, 2022).

Both cases of Femtech, directly and indirectly, engage with algorithms and the Internet. In both cases, connection to the internet is needed to access the global network of digital information technologies which connect doctors to the database of patients used in TailorAid, and connect pregnant people to the medical abortion services offered by WoW. The relation to algorithms, however, is not as direct for both cases. More directly utilising algorithms, TailorAid uses coded formulas written into software that, when triggered, prompts the software to make relevant predictions of which side effects a patient can experience with contraceptive pills (University of York, 2022). WoW, on the other hand, experiences algorithms in a less direct form, where algorithms on various internet platforms determine the relevancy of the content published by WoW, controlling the engagement of their content (Golino, 2021).

Zooming out from these case studies to the societal relevance, these studies will outline outcomes which can be applied to a broader context of FemTech products and services. The FemTech niche spans a broad, expansive definition of apps, trackers, and wearable devices to ‘empower’ bodies through the personalised understanding of menstruating, menopause, pregnancy, childbirth, hormone regulation, and so on. These forms of empowerment can be viewed as exclusive to an affluent population who can afford FemTech products and services, be seen as tools with the potential to govern targeted bodies, and normalising the mitigation of “male discomfort” by making menstruation, menopause, pregnancy etc silent and unseen (Burt-D’Agnillo, 2022, p.16). These broader implications of FemTech will be reflected on in this Research.

Literature Review

The literature reviewed in this paper critically engages with the social, historical, and political dimensions of algorithms and FemTech. Guided by *Silicon Values* by Jillian York (2022), *Atlas of AI* by Kate Crawford (2021), and *Testo Junkie* by Paul Preciado (2013), these authors each offer perspectives on the relationship between Surveillance Capitalism, Algorithmic Governance, and the Post-Colonial. To relate these concepts to the specific focus of this research, Feminist Technoscience studies are reviewed to explore the development of FemTech which I will relate to the aforementioned theorists' work in the analysis of this research through examining two case studies.

Surveillance Capitalism

Coined by Shoshana Zuboff in 2019, Surveillance Capitalism is a useful concept to understand when examining the tractability and profitability bodies. Zuboff defines Surveillance Capitalism eight times, the most relevant for this research being the third definition: "A rogue mutation of capitalism marked by concentrations of wealth, knowledge, and power unprecedented in human history", and the sixth: "The origin of a new instrumentarian power that asserts dominance over society and presents startling challenges to market democracy" (p.8). Surveillance Capitalism also encompasses a system that has enabled a milieu in which companies, not governments, get to decide how people may express ourselves (York, 2022, p.x).

Reproductive Surveillance Capitalism

Relating Surveillance Capitalism to FemTech and reproductive health, the concept 'Reproductive Surveillance', has been defined as a concept within the Surveillance Capitalism logic of accumulation by raising concerns regarding privacy of the data use in apps and services of FemTech (Ford et al., 2021, p.52). As such, Reproductive Surveillance encompasses the role that FemTech tracking services have as a form of government, relating to the digital power structures in place which collect and use mass amounts of data from reproductive health tracking apps (Ibid).

This is also done through filtering information through ‘platform censorship’, which controls access to, in this case reproductive health information, through algorithmic filtering on social media platforms (York, 2022. p. xi). Platform censorship, as defined by York, is “the suppression of speech, public communication, or other information, on the basis that such material is considered objectionable, harmful, sensitive, or ‘inconvenient,’” (2022, p.9). This works by the imposition of regulation by a governing body, like Meta or Google, to suppress or control expressions that contradict or challenge their values or beliefs (Ibid).

York further elaborates on the social, cultural, political, and economic values produced in Silicon Valley — the global hub for technological innovation situated in California, USA (York, 2022, p. viii). A ‘Silicon Value’ that I will focus on throughout this research is that the policymaking process in Silicon Valley increasingly resembles that of a government — “a resemblance to government policymaking without democratic participation [which] implies an authoritarian approach” (Ibid, p.85). As York elaborates, “if tech companies control how businesses, NGOs, governments, and people communicate with each other, as the social media giants currently do, their interference or collaboration can present significant risks to universal human rights like freedom of thought and expression” (Ibid.).

Reproductive surveillance and the policy making of Silicon Valley are relevant when discussing FemTech in a time of medicalisation and ‘BigTechification’ of reproductive health — ‘medicalisation’ referring to the dominance of pharmacology in the global North, and ‘BigTechification’ to referring to how the most influential tech companies know as Big Tech ‘rewire’ economy, society, and the state (Hendrikse et al., 2021, p.2). The fusion of medicine and BigTech symptomatic of a ‘Pharmacopornographic Era’ (Preciado, 2013, p.51), a descriptive concept for contemporary society in the Global North where pharmacology meets pornography, exemplifying a period of the body’s “techno management” — a way of governing the body made

possible by, among other factors, Reproductive Surveillance and ‘Silicon Values’ situated in capitalism (Ibid, p.40-41).

Pharmacopornographic Era

In *Testo Junkie*, Preciado explains this concept of the Pharmacopornographic Era in detail. Dissecting the term, ‘Pharmaco’ refers to ‘Pharmacology’ — the use of drugs and hormones to alter the functioning of bodies and minds, while ‘pornographic’ refers to the sexualization of the body and of medication (Tucker, 2013). The fusion of *Pharmacology* and *Pornography* to describe how the domination of drugs and hormones are fetishised and commercialised, operating through capitalist control and management of bodies, desires, and pleasures (Preciado, 2013, p. 40). Preciado illustrates this by comparing the medication produced and commercialised by Pharmaceutical Industries to "white and viscous gold" (2013, p.40) — the term "white" alludes to the common colour of medications like Viagra and Contraceptive Pills (Ibid, p.125). The administration of making drugs profitable and sexualised is realised by a complex interplay of individuals, corporations, and the state (Preciado, 2013, p.170). In this research, analysing the interplay of FemTech and BigTech as governing groups of corporations administering the profitability and sexualisation of reproductive health.

Preciado continues to write that pharmacology and pornography are technologies that shape our bodies and our identities into Pharmacopornographic Subjectivity (Ibid, p.81). This subjectivity, inspired by Michel Foucault’s framework on subjectivity and bio-power, produces the *Pharmacoporno-Body*, the product of a body whose eggs, relationships, sperm, can be controlled by health technologies (Ibid, p.51), such as those discussed in FemTech. The subjectivity of bodies, and governing of bodies through Reproductive Surveillance, are points of focus that I have been made sensitive to by these theories by Preciado.

Menstrual Capitalism

The profitability of FemTech has not gone unnoticed by innovators and investors active in the industry (Mishra & Suresh, 2021). Specifically, the ability to reap economic reward from products and services targeted at the menstrual cycle is a concept coined as Menstrual Capitalism (Crawford & Waldman, p.178, 2022). Targeting bodies to track their menstrual cycle with paid apps or to use expensive sanitary products has been criticised for constructing “a menstruation industrial complex”, with companies “profit-seeking and woke-washing advertising” — framing advertising using benevolent language that appeals to “progressively-oriented sentimentality” (Haneman, 2021). Appropriating normative, aesthetic ideals of “femininity” (Preciado, 2013, p. 102), the “menstrual industrial complex” outperforms normative aesthetic ideals of “masculinity”, a pattern of bio-political asymmetry of bodies (Preciado, 2013, p.170-171). As such, FemTech could be seen to owe part of its success to Menstrual Capitalism as it sustains profit margins by commodifying the menstrual cycle, specifically selling products that alleviate the symptoms of having a menstrual cycle (Bruch & Richardson, 2023, p. 1259). FemTech software and devices becoming even more profitable through the use of algorithms (Femtech Companies Using AI Worldwide in 2021, by Subsector | Statista, 2021), with algorithmic prediction models forming their niche within FemTech which collect mass amounts of data from bodies to code models for fertility, menstruation, ovulation, and other tractable aspects of the female body (Ford et al., 2021, p.52). With this in mind, a discussion of what algorithms are employed in FemTech, is important to understand the context of this research.

Algorithms

Algorithms are “procedures that determine what kind of information is retrieved from a large mass of data” (Merriam-Webster Dictionary, 2023). They are generally interpreted as accurate due to a strong emphasis on rationality, predictability, and faith in mathematics — a concept Crawford calls Algorithmic Exceptionalism (2022, p. 211-213). As such, there may be trust built for

the algorithms encountered in FemTech, such as those predicting a person's next menstrual cycle or pregnancy. Like the outputs, the programmers of algorithms may be treated with similar valorisation for the fact that they are highly educated (bid).

The process of reliable data collection and selection for algorithm programming is a process that Crawford outlines the implications of in her book *Atlas of AI* (2021). Specific to FemTech software, the quality of the data in terms of reliability and representation is important when implementing algorithms that have the potential to govern the health of the target bodies using FemTech (Crawford, 2021, p. 127). Both Crawford and York engage with this issue in *Atlas of AI* and *Silicon Values* respectively, investigating the implications of programming algorithms with values of profitability, productivity, and masculinity (Crawford, 2021, p. 77).

Informed by Crawford's outline on biased algorithms in the field of Artificial Intelligence (AI), this research focuses on gender bias, an issue identified by the Center for Countering Digital Hate (2021) and by Young, Wajcman and Sprejer in their *Women in Data Science and AI Policy Briefing* (2021). Bias, as understood as the inclination or prejudice for or against a belief, becomes an important element of algorithm development in FemTech where over three-quarters of professionals who develop algorithms globally identify as cisgender males (Young et al., 2021). Given this ratio, the prevalence of algorithmic programmers who have experienced menstruation or the learned fear of an unwanted pregnancy is potentially under 25%. While it is not exclusively male-identifying tech-experts who are programming algorithms, it is the shared experience bodies targeted to use FemTech that bear the brunt of this industry when the algorithms are biased toward a masculine perspective. A masculine perspective in technology has been studied by scholars in *Feminist Technoscience*, with results showing that a patriarchal tech-industry attributes increasing wealth through exploitation, employing hierarchal work structures, focussing on independence, objectivity, rationality, and unemotional behaviour (Gupta, 2020, p.159). Masculine bias in

algorithmic programming may have potential consequences and contradictions to be cautious of when analysing the algorithms used in FemTech.

Transparency of BigTech

What arose in multiple sources in my research was the apparent lag that occurs from the programming of algorithms to the regulation of their effects (Rosas, 2019, p.323), a common occurrence with technological advancements (Crawford, 2021, p.115). A reason for this is the reluctance of researchers and programmers in tech to take ethical responsibility for their work (Ochigame, 2019). Ochigame highlights the paradox that arises when programmers of BigTech set their own internal regulations that favour their business interests and financial rewards (Ibid). Microsoft, Google, Meta, and IBM have each published their foci on "ethical practices", "responsible practices" and "technical adjustments related to biases and fairness", promoting their practices' legitimacy through simplified, benevolent language (Ibid). What Crawford identifies as a pattern within BigTech, is that the algorithms that are produced are too complex to regulate, while being too powerful to refuse — like an ambitious grey area that BigTech companies take advantage of when developing new algorithms (2021, p.214).

Quoted by both Crawford (2021, p.222) and York (2022, p.211), are the words of Audre Lorde that "the master's tools will never dismantle the master's house" — a powerful metaphor in the context of BigTech meaning those in powerful positions in tech will not willingly give up their control or provide complete transparency regarding the extent of technological advancements. While critics of BigTech have pressured policy makers in the industry to be more transparent about their practices, the response statements have highlighted inconsistencies in what can be considered 'trustworthy' and private as their disclaimers only disclose a fraction of the truth (Ochigame, 2019). While technical and legal solutions are rising for issues such as biased data sets, weak privacy policies, and transparency about data use, their actions speak louder, as will be explored in this research.

Post-Colonial Lens

While FemTech products, services, and software are predominantly distributed in the global North (Statista, *Femtech Companies Worldwide in 2022, by Region*) the data, labour, and nature required for its sustenance relies on the exploitation of the global South (Gurumurthy & Chami, 2021). Specific to data collection and the running of programs, identified by Gurumurthy and Chami, there is “an uneven geography in the data economy”, putting the exploited regions of the global South in powerless positions when holding digital corporations accountable (p. 11). The echoing of settler colonialism, where territories of the global North exploit territories of the global South, both virtually through data harvesting, and physically through exploiting cheap labour and natural resources, inform a critical concern for the growth and success of algorithms (Crawford, 2021, p.15)

A post-colonial reading of algorithms and data harvesting are discussed by Wendy Chun and Joy Buolamwini respectively. Published in the 2022 *Catalyst Journal*, Chun is a scholar, author, and professor who discusses the enduring power of raced and gendered robots within the cultural imaginary, linking robots to a history of slavery (2021, p.14). Chun elaborates on the genealogy of the word ‘robot’ and its translation, *Robota* in Czech, to mean free labour — relating to the kind of free or inexpensive labour that is used in algorithmic programming as a symptom of the colonial history (Ibid, p.15). Chun’s work further explores how digital technologies shape socialised racial structures and how technology impacts marginalised people. These explorations are reflected by Joy Buolamwini’s work, a computer scientist and researcher at the Massachusetts Institute of Technology (MIT), who exposed in her 2020 Documentary, *Coded Bias*, how the data used in the MIT facial recognition software contained an essentialist race and gender bias which she highlights by being unrecognisable to the coding of MIT software. Based on Buolamwini’s experience of being subject to the coded biases of standardised machine learning systems of AI, Buolamwini started the Algorithmic Justice League (AJL), a North American based nonprofit organisation that

addresses the impact of bias and injustice in algorithmic systems (The Algorithmic Justice League, 2023).

The AJL published a document stating requirements in algorithmic development, some of which can be applied to the case studies in this research (The Algorithmic Justice League, 2023). The first requirement states that algorithmic prediction models must ensure ‘Agency and Control’ over the use of algorithms, meaning consumers need to have awareness of how algorithms work, who is involved in programming them, and what the risks are. The second requirement is to affirm consent for the users of algorithms, meaning there must be firm agreement between parties on how data is being used, if at all, with the option to dissent data use and there be no penalty for that. The data that has then been consented to, if so, shall exclusively be permitted for use by the party who has received this consent. The third consideration identifies the environments in which algorithms are *not* permitted for application due to the disadvantage this has on an intersection of categorical race, class and gender minorities. These requirements by the AJL inform my considerations during my analysis when exploring the post- and neocolonial practices that have reproduced in harvesting the financial rewards that algorithms in FemTech have.

Methodology

Methodological Approach

This research explores how algorithms used in FemTech have governing capacity over targeted bodies by utilising Surveillance Capitalism and ‘Silicon Values’ in the FemTech industry. This research employs a qualitative case study methodology, focussing on two organisations that operate in the FemTech sector. The case study research design identifies ‘cases’ for in-depth exploration of specific, select instances to gain a comprehensive understanding of the governing potential of algorithms in FemTech (Bryman, p.249). By selecting two cases using the Maximum Variation cases approach (Flyvberg, 2015, p.230), I enhance the depth of my research as I explore FemTech cases that highlight two different reproductive health medications that are used for

opposing purposes of reproduction — one medication used to prevent a pregnancy and regulate the menstrual cycle, and the other used to terminate an unwanted pregnancy. Other factors of variation I was intrigued to study between the cases were the gender diversity of the organisations, and the business models administered by the two cases.

The analysis of the two chosen case studies will be done by outlining the results from the interviews conducted with both founders of the organisations, making connections to the relevant literature and theory to highlight in which instances algorithms are used as a method to govern targeted bodies of FemTech, and what is revealed by these forms of government.

Data Collection Method

The data collection for the case studies involves analysing a combination of primary and secondary sources. Primary data will be gathered through two, 60-minute interviews with the founders of both organisations, and secondary data will be sourced from offline and online resources, such through personal communication with scholars of Feminist Technoscience, Anthropology, and the Humanities, accompanied by relevant literature sourced from Google Scholar to provide a comprehensive context for the analysis. Keywords used in Google Scholar are *Feminist Technoscience*, *Surveillance Capitalism*, *Reproductive Surveillance*, and *FemTech*. The interviews are an important addition to the research as they offer specific and unique experiences of algorithms in FemTech which cannot be found through secondary sources as the information gathered from my interviews is not published.

When conducting the secondary research online, I was confronted by the effect of algorithmically predicted search suggestions and echo chambers, conditions on the internet where an individual gravitates towards information that supports their beliefs, as opposed to challenging them (Bright et al., 2020). As I was researching what algorithms are, how they operate, where they are programmed, by whom, with what data, and where these algorithms are consumed, I made a conscious effort to avoid the influence of algorithms, refraining from using internet search

suggestions. To overcome the online limitation of echo chambers, I have relied on hard copy materials of *Atlas of AI* (Crawford, 2021) and *Silicon Values* (York, 2022), and sought relevant insights from academic scholars by inquiring recommendations from professors and colleagues which then accessed via the University Libraries, or retrieved via e-mail. Scholars I personally communicated with were Rodrigo Ochigame (2023), professor of Anthropology at Leiden University, Friso van Houdt (2023), senior lecturer in the Humanities at Erasmus University College, Lila Athanasiadou (2022), author and researcher at TU Delft, and Golnar Abbasi (2022), artist and architect from Willem de Kooning Academy. This method of research formed a diverse library of literature which guided my research. Secondary research using Google Scholar in the field of Feminist Technoscience and Science and Technology Studies informed more specified analyses of reproductive surveillance, FemTech, and the relation of this to post-colonial theory.

Case Study Selection

There are multiple “avenues” of healthcare technologies, this research focusing on the roles of healthcare technologies specific to ‘Health promotion via social media’ and ‘Artificial Intelligence in Health’ (Reddy et.al, 2022). The distinction between these roles are exemplified by the case studies, ‘Artificial Intelligence in Health’, relating to TailorAid and ‘Health promotion via social media’ relating to Women on Web. A missing role from the 2022 review by Reddy et. al that Women on Web utilises is Telemedicine, the remote services of diagnosis, monitoring, advice, and administration of health services using communication technologies (Yoldemir, 2022).

TailorAid

I have chosen to examine TailorAid for this case study as this start-up was developing an algorithm targeting patients interested in taking the contraceptive pill. The business structure of TailorAid was a point of interest to me when choosing this case as a start-up is in a developmental stage of business, bringing a new product to the market, and is rooted in innovation (Baldrige & Curry, 2023). With their business in this stage, the CEO was open to discuss TailorAid's business

model and discuss his personal affiliation to the start-up, compared to more established organisations like *Tuune*, a competing, more established company who were unavailable for discussion, based on multiple failed attempts to get in contact with the organisation, including two e-mail inquiries, and inquiry via their social media accounts. To gather information on TailorAid, I connected with the CEO, Oliver Rockall, on LinkedIn to plan the two, 60 minute, semi-structured interviews via Zoom video communication software. The specificities of TailorAid's project was not disclosed on their website, www.tailoraid.io, meaning the information to analyse for this research is based on what was offered during the interviews.

During the first interview, I asked open questions to establish an understanding of how the start-up was initiated, what the mission of the start-up was, and what the plans were to distribute their software. Based on Rockall's responses from the first interview I formulated pointers for the second interview, discussing whether medication was prescribed to every patient who inquired the contraceptive pill and if, based medical complications that can arise from hormonal birth control methods, the algorithm would advise a patient against taking the contraceptive pill (Blair, 2023, p.23). The conversation led to discussing how to account for placebo side-effects which may arise if patients are told which side-effects they are likely to experience when taking the prescribed contraceptive pill, who the patients could report back to if the side effects were severely negative, and whether the doctor or the algorithm would then be held accountable for inconsistent prediction of side-effects. Furthermore, I asked if and how cultural and personal factors were taken into account in the decision making of prescribing the contraceptive pill, as well inquiring about the position of the founders of TailorAid in starting this organisation, wondering what their motivation was to create this software. Lastly, Rockall and I discussed who the competitors are in this field of precision medicine.

These pointers guided the conversation, providing insights into the start-up, the data collection methods for building the algorithm, their view on ethical liability, and the positionality of their background in business and economics.

Women on Web

The choice to study WoW was made to be able to explore the limitations of online service-provision — a transition that was necessary following restrictions experienced by Rebecca Gomperts' offline work of Women on Waves. Indeed, the “web” of Women on ‘Web’ is a variation of the first organisation founded by Gomperts, Women on Waves. (Women on Web, 2023). Women on Waves provided medical abortions to pregnant people who wished to terminate their pregnancy but were unable to in the country they lived in (Wie Zijn Wij?, 2023). Led by Gomperts, Women on Waves conducted numerous offline campaigns, including sea voyages to countries such as Morocco, Portugal, Poland, Ireland, Mexico, and Guatemala (Campaigns, 2023). The Women on Waves' "Abortion Ship" transported pregnant individuals to international waters, where they could legally undergo medical abortions following Dutch legislation, being on a vessel registered in the Netherlands (Ibid). Then to be able to transcend national borders, Gomperts initiated Women on Web in 2005 where the organisation could provide pregnant people with abortion medication via the Internet (Ibid, 2023).

In doing so, I conducted two focused, unstructured interviews of 60 minutes each with the founder of the organisation, Dr Gomperts. These interviews took place at the Women on Waves office in Amsterdam and discussed the progression of Women on Waves to Women on Web, the legal restrictions faced as an online abortion provider, competing organisations, and the organisations' experiences of digital censorship: the use of algorithms by tech companies, such as Meta or Google, which selectively limit or remove content from their platforms like Facebook, Instagram, and WhatsApp (Cobbe, 2020).

The choice to study WoW over other online abortion providers like *PlanCPills* or *HeyJane* is informed by Women on Web's worldwide focus on provision of abortion pills, unlike similar organisations which are based solely in the USA. The worldwide geographical reach of WoW while having an office in Amsterdam allowed me to conduct the interviews in person and retrieve valuable information from Gomperts in an informal setting.

Limitations

Common limitations that have been identified for the case study research design are that cases are (1) only exploratory, (2) lack external validity, (3) are subjective and lack reliability, (4) are not replicable, and (5) cannot be generalised (Flyvberg, 2006, p.221). In disagreement with these limitations, Danish Geographer Bent Flyvberg accounts that case studies *are* indeed a necessary and sufficient method for certain important research tasks, particularly useful when emphasising contextual understanding, capturing complexity and uniqueness, and when bridging the gap between theory and practice an in-depth exploration of a field (Ibid, p.237-242).

Within these cases, in-depth case studies are insightful when exploring how Surveillance Capitalism and 'Silicon Values' exert complex and unique implications when engaging algorithms in the access to the contraceptive pill and the abortion pill. The relevant literature has made me sensitive to issues such as post-colonial exploitation of labour and data, reproduction of 'Silicon Values' of putting people over profit, and the issues regarding reproductive surveillance — implications which lie behind FemTech's framing of empowerment. These cases allow me to bring an intersectional reading of FemTech, applying the literature surrounding Surveillance Capitalism, Feminist Technoscience and Post-colonialism to reveal 'Silicon Values' in the algorithms used to govern targeted bodies.

Analysis

The analysis section of this paper will discuss the interviews conducted with the founders of TailorAid and Women on Web, contextualising them with relevant literature to form conclusions to

my research question. The section will start by providing a summary of the main results obtained in the interviews, followed by analysing these results through lenses of Feminist Technoscience, Surveillance Capitalism, and Post-Colonial Theory. I will then highlight three elements of variations between the two case studies: the different uses of algorithms in reproductive healthcare, the business structures, and the relationship of the founders of the organizations to the reproductive health. Furthermore, the analysis will consider the broader social implications of these findings, exploring the potential consequences of employing Algorithmic Governmentality through Reproductive Surveillance. This involves discussing concerns associated with the profitability of reproductive surveillance, the need for greater diversity and inclusivity in the programming of algorithms, and the relationship between the global North and global South in this configuration. Lastly, I will outline limitations of the case studies and recommendations for further research.

TailorAid

Through two interviews with the CEO of TailorAid, Oliver Rockall, I gained insight into the start-up for my analysis of what can be revealed from algorithms used in FemTech. Rockall started the conversation by defining the aim of TailorAid, which is to “use AI to improve the lives of patients in an equitable manner by bridging the gender gap in access to medication and medical information”. During the first interview, Rockall explained how the AI program functioned, the data used to train the algorithm, and how the start-up was founded.

The first topic that Rockall outlined was how the AI model works by comparing patients data to the dataset to compare similarities and differences to patients of similar biomarkers, giving the doctor an overview of side-effects per patient. Rockall stated that “we don’t make a suggestion, otherwise we would be legally accountable”, as to generate AI in regulated industries such as healthcare means “we would be buried under administrative regulation, which to me is a big barrier in healthcare.”. Rockall explained that suggestive AI requires extensive administrative work to comply with regulations related to data privacy, security, and ethical considerations, and that

applications that involve sensitive data, such as personal information of biomarkers, require additional administration to comply with data protection laws. Our conversation concluded that, due to the model chosen for this software, the output would not be able to advise when a patient should *not* take any medication, this decision would have to derive from the doctor.

Reflections on Reliability and Representation

Following the initial interview, I had certain thoughts and considerations that I addressed in a follow-up discussion. First, I asked if the contraceptive pill was appropriate for every patient to use who was looking to regulate their menstrual cycle or prevent pregnancy, and if Rockall thought there was a ‘right’ a contraceptive pill for every patient to use. I also enquired about the reliability of the dataset used to train the AI, and if the dataset was diverse in age, anatomic variety, biological build, and geographic location. Following from this, I asked about the correlation between patients with the same biometric data markers and their experience of side effects when taking the same contraceptive pill, and what complications the start-up face when using data reported by patients who are trusted to report their symptoms, especially if they have neutral or positive-affecting symptoms. Further questions revolved around the data and if it accurately represents patients’ symptoms before taking the medication, during, and after stopping the medication to ensure the reported symptoms were correlated to the drug and not other factors. In discussion with Rockall, I learned that the first training data set for the algorithm developed by TailorAid was from a clinic in Columbia, using data from 27,000 patient health records. In diversifying their data set, the start-up included the Adverse Events Reporting System (FAERS), a public data set administered by the FDA.

While the larger and more diverse FAERS database helps to mitigate bias, questions regarding the reliability of data arise as the dataset does not account for symptoms before or after the patients have taken the medication, and whether the symptoms are true cannot be verified. Where 2/3 of the cases were reported by patients themselves, and not requested by doctors, there is

a risk that the symptoms will be inputted more often when a patient experiences harsh negative symptoms (Sen & Lerman, 2007). Rockall contradicts this by saying that "who enters the data doesn't matter," implying that they do not pay much attention to bias in that aspect.

Data Harvesting

When analysing the choice of the dataset from Colombia, the issue of consent and representation are primary concerns. Following Buolamwini's model for Equitable and Accountable AI (2020), affirmative consent should be obtained from each patient before their data is sold for use in software training. However, during the interview, it was confirmed that consent was left to the owner of the data set, which in this case was the Electronic Health Record Centre of Colombia. Another concern with data set is the issue of representation. This data set, if complete, would be a model for predicting symptoms for patients in Columbia. When the data is being used to predict symptoms for patients in other regions, the data is being used out of context. This is something commonly done by AI programmers, where there is no standardisation to note where data comes from, allowing programmers to use data that is significant for their program but not relevant to the context (Crawford, 2021, p.104). This AI model would therefore offer incomplete predictions if a patient in another region were to request contraceptive pills using TailorAid's model, as the context of the data is not representative for other socio-cultural realities.

Limitations of using Algorithms in TailorAid

Reflecting on the information provided by Rockall, a limitation regarding the predictability of symptoms of the menstrual cycle is that it may oversimplify and flatten the nuanced, personal experience of menstruation, which may reinforce pressure for patients to "just get on the pill" (E. Littlejohn, 2021). Supporting the concept of 'algorithmic exceptionalism', the algorithmic prediction embedded in mathematics may pressure patients to conform to the standardised of menstruation, disregarding patients' own individual experiences. The capitalisation of medication for bodies, specifically regarding sex and reproduction, is discussed by Preciado as symptomatic of

the Pharmacopornographic Era as the commodification perpetuates a system of oppression that reduces bodies and experiences to objects for profit, contributing to a broader culture of over-medicalisation in which pharmaceutical companies profit from perpetuating the idea that the body requires constant management and control (2013, p.169-170). As a product, Preciado's theory on the *Pharmacoporno-Body* could be applied as the reproductive system undergoes control by health technologies (Ibid, p.51)

Furthermore, the implementation of AI to predict side effects of the contraceptive pill highlights limitations where “where affordability, the absence of a steady internet supply, and the lack of a device to use the technology” contribute to a “digital divide” of the global North and South (Reddy, et al., 2022). Indeed, the more affluent regions of the global North where AI is being implemented may have a higher financial budget and health literacy training to effectively implement AI software in their medical practice. However, in less affluent regions, accessing and processing such information may not be an option due to these impediments of affordability, internet supply, and divide access (Ibid). The implementation in the North, while being developed in the South, also highlights the digital divide where data and labour is being cheaply outsourced for these advancements (Ibid), which supports Chun's existing theory on digital technologies which shape structures which exploit marginalised people, specifically how data and labour harvesting for algorithmic programming echoes colonial histories (2021, p.15).

Women on Web

I will now outline how reproductive healthcare provision by WoW collide with algorithms when targeting bodies in a way that is not as immediately apparent as the case of TailorAid. As such, interviews with Dr. Gomperts outlined that despite the existence of safe and accessible options to abortion pills, algorithmic content regulation hinders access to these options when individuals seek information through online sources like WoW's website, or social media platforms. This means that when someone searches for information about abortion or abortion services, a content

regulating algorithm may prioritise certain websites or information, while suppressing or filtering out others (Cobbe, 2020). The result of this, according to Gomperts, is that individuals who are looking for information or access to safe abortion services may encounter difficulties in finding the resources they need as they have been censored, which can contribute to the perception that these options are hard to access or unavailable, which is not the case. Rather, Gomperts works in ways to combat these covert operations and finds ways to make the censorship public.

Platform Censorship

The issue of platform censorship for Women on Web was clearly communicated through the conversation with Dr.Gomperts and from Women on Web's 2022 'Digital Rights Issue'. First to expand on the concept of platform censorship, this occurs on social media for "violations of community standards" or for the "promotion of hate speech or misinformation", placing restrictions to harmful information on internet platforms (Cobbe, 2020). These "community standards", as stated on the Meta Transparency Center, "outline what is and is not allowed on Facebook", writing policies based on "feedback from our community and the advice of experts in fields such as technology, public safety and human rights." (2022). These policies are "written to ensure that everyone's voice is valued" and are "inclusive of different views and beliefs — in particular those of people and communities that might otherwise be overlooked or marginalised". (Ibid). Despite these policies claiming the safety of the platform due to eradicating harmful information, when these standards are applied to social media posts made by WoW, it is exactly these "standards" that censor voices that challenge dominant power structures and express "overlooked" perspectives of abortion service provision. This case study analyses these 'policies' that Meta and Google employ to censor online platforms, by assessing the claims they impose against WoW's content that promotes medical abortion services.

Platform Censorship: Meta.

The department at Meta responsible for the algorithmic filtering of content on Facebook and Instagram define the sets of rules which algorithms use to rank content across the platforms and determine what is seen, and what is not (Cobbe, 2020). These algorithms evaluate every post, advert, Story, and Reel, scores the content, and arranges them per user interest (Ibid). If, however, if these algorithms indicate that the content exceeds community standards, the post is removed from the platform, or the page is temporarily disabled (The Digital Rights Issue, 2022). In this way, internet platforms such as Instagram and Facebook are curated by those who make the rules for the algorithms.

In the examples given by Gomperts (Appendix 1) where Women on Web experiences censorship for exceeding the ‘community standards’ that ensure “safety of all social media users”, highlight that there may be a misconception about what defines ‘safety’. Firstly, an example of censorship that was given was an advertisement for Safe Abortion Pills was removed for ‘exceeding community guidelines’, with no other explanation. This sort of ambiguous algorithmic filtering may be a result of a filter by which ‘female’ reproductive health are filtered more strictly than adverts for ‘male’ reproductive health (Safronova, 2022). Reports analysing Meta ads state that advertisements promoting male health information, such as adverts for Viagra (medication produced by Pfizer as treatment for erectile dysfunction) are circulated to their intended audience (Walker et al., 2023) despite abortion pills being proven as a safer medication than Viagra, according to Gomperts. Imbalanced and inconsistent gendered policing are contradictory to Meta’s statements on gender equality, where instances like this imply the objectification and sexualisation of bodies more severely for the ‘female’ than the male body — an imbalance of biopolitical value which in this case seems influenced by the sexualised narrative that relates abortion to pregnancy, intimacy, breast feeding, birth etc, and Viagra to strength, endurance, and power (Preciado, 2013, p.171).

Furthermore, when paid adverts placed by WoW are censored, the advert ‘space’ is replaced by other adverts, often by higher-paying companies, as identified by the Center for Countering

Digital Hate in 2021. One organisation in particular has circulated Meta's platforms, advertising so-called abortion pill “reversal” (APR)— a procedure that attempts to counteract the abortion pill by “flooding the system with an abundance of progesterone, [...] bonding to the receptors in place of mifepristone” (Edwards, 2022). Among others, these services are offered by Live Action, a non-profit “pro-life” organisation in the USA dominated by religious groups dedicated to an end to abortions (Stern & Sundberg, 2018). Unlike the FDA approval of mifepristone and its place on the WHO list of essential medicines, APR is not approved by the FDA and poses risks to the health of pregnant bodies (CCDH, 2021). Despite this, APR was reportedly promoted 92 times on Facebook in 2020, with Meta receiving payments ranging from \$115,400 to \$140,667 for these 92 ads. Notably, 98% of these ads directed users to websites that claimed the effectiveness of abortion reversal, despite their health implications (CCDH, 2021). As well as this, despite Meta's policy of suppressing inappropriate content for minors (users under the age of 18), the analysis by CCDH revealed that these ads were displayed to an audience aged 13-17 over 700,000 times (2021).

In these cases of platform censorship, Meta maintains a structure of profit accumulation by choosing to resemble wealthier, more repressive governments at the expense of the right to expression of liberal views of pro-choice platforms like WoW — putting profits over the health of people accessing accurate information about abortion services (York, 2022, p. 85). With the basis on which WoW’s content is censored being that it is circulating information which “violates community standards” and “promotes hate speech or misinformation”, the choice to populate these platforms with information that, medically speaking, violates community standards by promoting misinformation on APR, is indicative of inconsistent algorithmic filtering which provides millions of people, or, withholds from those same people, information regarding a life-altering decision concerning reproductive health and the choice, or choice not to, bear children. It is important to note here that the discussion of whether the pro-choice standpoint should commit to supporting APR, as APR dictates a choice in autonomy over reproductive health, though with the inconsistent data

regarding the efficacy of APR this discussion remains murky (Pruski, 2022, p.252). I believe that access to accurate and comprehensive health information is crucial for making informed reproductive health decisions, and algorithms on the internet should not be a software which censor this information to make informed decisions about their own bodies and health.

Platform Censorship: Google.

In conversation with Gomperts, it was made clear in which other ways the organisation experience censorship. Other than platform censorship, Google Core updates, occurring at least three times per year, are implemented to improve the quality and relevance of Google search engine's results (*The Digital Rights Issue, 2022*). As a result, WoW experienced an 80% reduction of traffic to their website in 2020, with another 40% reduction in 2023, coinciding with two Google Core updates (Ibid). Gomperts, along with reports from the 2022 Digital Rights Issue, state that “the only thing that changed was the algorithm”, that nothing else in their outreach had changed for these reductions to have occurred. There are other factors which can reduce traffic to their website, such as people organically not interacting with the WoW website, though the sharp declines in traction with every update make a substantial argument that these updates are a main factor. Mirroring the example highlighting inconsistent circulation of adverts for APR, up to 83% of Google searches for abortions resulted in at least one promoted ad for APR, 94% of which claim the procedure is effective (CCRH, 2021).

Digital Strategies Against Censorship

In response to content censorship, Gomperts outlined the strategies implemented to keep providing accurate information on abortion provision. This is done by producing ‘sibling accounts’ that use near identical account names to keep providing information on safe abortion to those who need it (Hellerstein, 2023). They also run campaigns to raise awareness of censorship as this form of information filtering is something unseen by the consumer — exactly because the information that is censored no longer circulates on the internet. By promoting hashtags such as

[#DigitalRightsAreHumanRights](#) and [#StopAbortionInfoSuppression](#), and asking online members of their Facebook and Instagram platforms to share their content and to tag "[@Instagram](#) [@META](#) [@TikTok](#) [@YouTube](#) [@Google](#)", WoW "calls for transparency and accountability on the part of tech giants" (The Digital Rights Issue, 2022). Hashtags, as York explains, are digital forms of protest as they unite social media users using the same hashtag and show solidarity for a particular cause, exemplified by the use of [#BlackLivesMatter](#) reflecting outpouring anger and grief in response to police brutality against black people in the USA (2021, p. 37-38). As well as this, WoW has conducted a list of "Demands for Big Tech", which demand reform to Google's screening criteria for health content, push for more nuanced Google advertising policies, hold social media platforms accountable for flagging misinformation about abortion care, and provide more transparency around social media content moderation policies (Women on Web | [@abortionpil](#), 2022). These actions falling inline with Buolamwini's requirements for algorithmic development published by the AJL, whereby Buolamwini advocates for agency and control over how the algorithms that are disadvantaging them are administered (Algorithmic Justice League, 2020).

Limitations

Similar to the limitations stated for TailorAid, Telemedicine services like WoW require a connection to the internet and a device to start the consultation with, contributing to the digital divide of people who can afford these technologies (Reddy, et al., 2022). Personal Instagram and Facebook accounts are also needed to be able to engage with WoW's content. However, if these requirements are met, the services are able to be administered without the interference of a doctor or physician which can increase agency by getting abortion pills when a clinic is not physically reachable, when laws restrict abortion, or where the decision is to be kept private.

Comparison

The application of algorithms to both healthcare technology avenues of 'health promotion via social media' and 'artificial Intelligence in health', have provided insights to the implementation of Surveillance Capitalism and 'Silicon Values' in governing the reproductive health of target bodies of FemTech. The use of algorithms can be identified in TailorAid as a way to decrease barriers to healthcare, contrasted by the use of algorithms against Women on Web to increase barriers to healthcare. The contrasts of the cases concluding the governing capacity of algorithms as they work in enabling and gatekeeping information from people accessing reproductive healthcare.

Where TailorAid is founded by three individuals who have not experienced menstruation or pregnancy, their position in developing this algorithm is biased toward a male experience of reproductive healthcare which may undermine the implications of increased pressure to take the contraceptive pill which and the long-term health consequences. Meanwhile, WoW fight to keep information about safe abortions online through the administration of BigTech, where Meta's censorship on adverts and social media posts that remove informative infographics, videos on how to order abortion pills, and advice on post-abortion aftercare from their platforms. This, along with the changes to the Google Search algorithm halting access to the WoW website, highlighting ways that algorithms administer obstacles to accessing reliable information for targeted bodies.

Further Research

If I could develop this research further, I would inquire a more technical understanding of algorithm development as well as the ethics of data science in greater depth. I would also be interested to explore which 'values' run parallel to those emerging from Silicon Valley, exploring if 'Silicon Values' are unique to Silicon Valley, comparing values emerging from other technological hubs such as 'Singa-con Valley' in Singapore, or 'Silicon Wadi' in Israel to explore the globalisation of 'Silicon Values' and the implications hereof for the globalising market of FemTech.

Conclusion

From rubber ‘sanitary bloomers’ to silent electric breast pumps, the contraceptive pill to the abortion pill, empowerment to control, the global North to the global South — there are multiple trajectories that this research has brought attention to. Whether these developments travel physical geographical landscapes or online networks, these routes meet at a crossroads where the development of algorithms applied to FemTech services reveal a complex intersection of Reproductive Surveillance, ‘Silicon Values’, and Post-Coloniality.

Contradictory to the framing of FemTech to empower bodies through increased knowledge and awareness of bodily functions, the ‘BigTechification’ of reproductive health concludes a ‘rewiring’ of bodily autonomy. This is demonstrated by the implications of programming algorithms in reproductive health which prioritise profit accumulation, normalise the generalisation of personal embodied experience of reproduction, and prove inconsistent content moderation which set political priorities of conservative ideals (Cobbe, 2022, p.744). In the context of the two case studies, this research has outlined and analysed the infrastructures of a for-profit start-up and a non-profit organisation, paying attention to how they differ in scale of operation, while both instances highlight Algorithmic Governmentality as the choice over bodily autonomy is manipulated by algorithmic prediction or algorithmic content filtering.

Concluding the implications of algorithmically predicting side-effects of the contraceptive pill in the case of TailorAid, the values of profitability and control over the body are exerted when assessing the start-up through Feminist Technoscience, Surveillance Capitalism, and Post Colonial theory. The justification of non-consensual data-mining, the questionable reliability of public, patient-administered data sets, and the male bias within the start-up conclude that the start-up centres business values, rather than the embodied experience of menstrual health and the complexities of taking contraceptive pills.

Similarly, when discussing algorithms that work to circulate, or not circulate, reliable information on platforms such as Meta and Google, the case study of Women on Web exemplifies the way that content moderating algorithms suppress safe sources to access abortion provision. The exploration of platform censorship concludes unreliable and inconsistent suppression of information and website blockages based on algorithms programmed by a profit-driven, male-dominated tech industry, resembling authoritarian policymaking (York, 2022, p.85). The specific example of algorithmic suppression of information to abortion mirroring the recent policy change where *Roe v Wade* was overturned by the U.S Supreme Court (Supreme Court Case: *Dobbs v. Jackson*, 2023).

What the emergence of Algorithmic Governmentality of bodies highlights is the need to actively critique the development and implementation of technology in FemTech, as benevolent framing of certain products and services can have societal implications that reinforce patriarchal, conservative, and Silicon values. It is crucial to recognise and challenge the ways in which Algorithmic Governmentality operate in this niche, and to prioritise the needs and experiences of marginalised communities. In doing so, FemTech can adhere to standards regulated by the embodied experience of the reproductive system, considering how FemTech can be programmed to move beyond just the framing of empowerment — constituting social relations that are more equitable than those that were constituted by a prior technology or than those that prevail in the wider society (Johnson, 2010, p. 12). This could be done by ensuring transparent data practice through stricter legislation and regulation of programming, affirming consensual data collection and use, ensuring representative and reliable training data, and streamlining content moderation with policies that reflect the values disclosed on their platforms. Though if the “master’s tools will never dismantle the masters house”, continued critical examination and reflection of Algorithmic Governance of FemTech is crucial to be able to find paths of resistance to the algorithms that govern targeted bodies.

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Appendix 1

