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**Progesterone as a New Actor: Women's Experiences of Using a Fertility App Hormone  
Tracking System while Trying to Conceive.**

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## Abstract

For many people, trying to conceive for a baby is a time filled with uncertainty and hope. Fertility apps can provide comfort and information during this time. However, self-monitoring can also intensify distress, and the sense of responsibility can become burdensome. Recent apps employ at-home progesterone hormone monitoring through urine testing (similar to at-home pregnancy tests), making previously hidden internal reproductive processes visible and known. In a sense, hormone testing once confined to the laboratory is now carried out by people in their own homes. Importantly, there is no psychological research on the experiences that are created while using this at-home hormone tracking technology. Therefore, this thesis addresses a gap in the research by exploring users' experiences of at-home progesterone tracking technology while trying to conceive.

Theoretically, this study argues for the use of feminist new materialism to understand how reproductive bodies are produced in relation to self-tracking technologies. Practically, it aims to understand what experiences and understandings are created through such entanglements with hormone tracking technology. Five participants who were trying to conceive tracked their menstrual cycle using a fertility app progesterone hormone monitoring system (Proof). Diary entries and semi-structured interviews were analysed using a reflexive thematic analysis informed by feminist new materialism.

Progesterone, as a new actor within the trying to conceive assemblage, created new ways of knowing and experiencing the body. Progesterone became an agent for change, within a context of limited medical support and the largely uncontrollable process of trying to conceive. Yet, this newfound sense of agency was ambivalent and required considerable effort from participants. As a new hormone to track, progesterone reconfigured the body into a well-

functioning environment conducive to pregnancy, and brought a previously concealed biological process of 'implantation' into a lived reality. Progesterone created a new phase with new challenges and opportunities to know the body better, which ultimately changed how participants experienced time. Finally, new affective experiences were created that were inseparable from the very practice of progesterone tracking. Anxiety was felt episodically through unclear outcomes that were drip-fed over time. Hope was materialized into something tangible and concrete when new progesterone thresholds were met. Overall, this study demonstrates through the use of feminist new materialism theory, the addition of a new hormone does not simply equate to greater fertility literacy or awareness. Rather, progesterone, as a non-human actor, was significantly involved in producing new ways of knowing, feeling, and experiencing the reproductive body.

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*Technology is not neutral. We're inside of what we make, and it's inside of us. We're living in a world of connections – and it matters which ones get made and unmade.*

- Donna Haraway

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## Chapter One: Introduction

In this introductory chapter, I set the scene by contextualising the topic of using fertility tracking technology while trying to conceive for a baby. I first discuss the sociotechnical landscape more broadly, and then provide context for what it means to try and conceive in Aotearoa New Zealand. Finally, I introduce the specific at-home technology that is looked at in this study.

### *Setting the Scene*

Humans have always made sense of themselves in relation to others and the environment, including when trying to conceive. Between the 1930s to the 1960s, frogs were used as living pregnancy tests (Elkan, 1938; Wide & Gemzell, 1960). Tens of thousands of African clawed frogs were injected with human urine. If the urine contained the hormone human chorionic gonadotropin (HCG), more simply known as the pregnancy hormone, the frog would produce eggs within five and 12 hours (Shapiro & Zwarenstein, 1934). Today, the frog has long left this role and instead, humans are now making sense of their reproductive functions through their relationships with technology.

At present, digital technologies have become extensions of ourselves and form part of everyday life. In common with many Western societies, Aotearoa New Zealand is highly digitised, with more than 80% of people owning a smart phone (Hughes, 2019), and a majority spending two to four hours online each day (New Zealand Policy Research Institute, 2023). As a result, technology has become deeply entangled with our sense of self, our embodied experience, and our meaning making (Lupton, 2016). In other words, humans are not simply living *with* technology, we are living *through* technology.

The extent at which technology has been taken up is transforming health systems in ways no one could have predicted. In China, scientists have recently developed an Artificial Intelligence (AI) driven robotic ‘nanny’ that monitors embryos as they grow into foetuses within an artificial womb (Chen, 2022). Such technology is not so far removed from Aotearoa New Zealand as one might think. For instance, Fertility Associates in Tāmaki Makaurau Auckland has an ‘embryoscope’ incubator with a built-in microscope and ‘nanny camera’ that monitors the quality of individual embryos as they develop (Fertility Associates, 2025). Recently, at the world’s first conference on artificial technology and fertility, speakers described human analog medical labour as the “bottleneck of the medical industry” (Curchoe, 2023, p. 216). Speakers argued that a shift towards the use of technology and artificial intelligence was vital to accomplish the “missing” 20 million babies needed (p. 216). As someone with lived experience of fertility difficulties, I find myself questioning what this move might mean for women like me. In other words, what are the implications involved for those who are trying to conceive with such intimately entangled human-technological relationships.

### ***Femtech and Reproductive Tracking***

Within a rapidly evolving technical landscape, a booming ‘Femtech’ industry exists (Balfour, 2023). Femtech consists of smartphone applications, wearables, and medical devices, which are designed to support women and improve their health (Steward, 2024). The industry is estimated to fetch a market worth of US\$117 billion by 2029 (Statista, 2024). Reproductive mobile software applications, also known as ‘reproductive apps’, are an especially popular form of Femtech, with stakeholders expecting a growth of up to 88% in this area (FemTech Analytics, 2021; Haile et al., 2018). Reproductive apps include pregnancy, menstrual, fertility, and more

recently, hormone tracking technology (Ford et al., 2020; Stujenske et al., 2023). While reproductive apps may not capture headlines like artificial nannies do, the technology is extraordinary in the sense that it brings the clinic into the domestic sphere. As Clark and Lupton (2023) have put it, “apps are striking for both their extraordinary capacities, and their increasing familiarity in our everyday lives” (p. 399). There are an estimated 200 million downloads globally for reproductive apps, with downloads highly concentrated in the global north, and Aotearoa New Zealand being one of the leading countries (Rampazzo et al., 2024).

### *Aotearoa New Zealand Context*

Reproductive rates are steadily declining in Western societies (Baldwin, 2019; World Bank, 2021). In Aotearoa New Zealand, reproductive rates have continued to fall since the 1960s (Boddington & Didham, 2009; World Bank, 2021). Importantly, a recent survey in Aotearoa found up to a quarter of New Zealand women experience infertility (Righarts et al., 2021). However, an overburdened health system makes fertility care extremely costly and limited in Aotearoa (Shaw, 2022; Shaw & Fehoko, 2023). Fertility challenges become even more difficult for minority groups, diverse communities, and those from lower socioeconomic backgrounds (Righarts et al., 2021; Shaw & Fehoko, 2023). At the same time, education systems tend to focus on the prevention of pregnancy, contraception and avoiding sexually transmitted infections, while fertility planning and awareness is largely disregarded (Shaw, 2025). Given these constraints, reproductive apps can appear as an attractive alternative means to learn about the reproductive body, and to achieve conception (Rampazzo et al., 2024; Grenfell et al., 2021).

To provide further context, reproduction is often framed as an economic liability, yet is it also positioned as a personal responsibility in neoliberal societies, such as Aotearoa New

Zealand. For instance, the National Party leader (and now Prime Minister) Christopher Luxon explicitly encouraged people to “have more babies” to help a dwindling economy (Hohmann-Marriott, 2023a, p. 199). This complex entanglement between politicizing reproduction as a social issue yet locating it as an individual responsibility produces an ‘ideal reproductive citizen’, where individual responsibility for fertility is taken (Lupton, 2015a). According to Lupton (2015a), the ideal reproductive citizen is productive in the sense that they do not require assistance of the state. Reproductive apps align with such neoliberal ideas of individual responsibility, and have more recently intersected with pronatalist movements, that encourage people to have more children. Some of the wealthiest and most influential figures in silicon valley, such as Elon Musk, Sam Altman, and Simone and Malcom Collins, have recently invested large amounts of money in reproductive technology, advocating for higher reproductive rates (Schlott, 2025). Elon Musk claims that “population collapse due to low birth rates is a much bigger risk to civilisation than global warming,” (Christensen, 2022). In this way, self-responsibility for reproduction is intensified to the point where those who try to conceive are expected to bear the weight of a future generation.

### ***Reproductive Apps in Action***

The empowerment promised by reproductive apps is alluring. Apps are frequently marketed as tools that provide users with a better understanding of their body and reproductive functions (Hendl & Jansky, 2022; Lupton, 2016). Reproductive apps operate on the assumption that simply rendering the interior body into transparent and knowable forms will automatically make the body more manageable (Andelsman, 2021; Lupton, 2013). According to Lupton (2015a), reproductive apps offer “rational monitoring and calculations” which promise to contain

the disorder, unpredictability, and anxieties of the reproductive body (p. 9). In the context of those who are trying to conceive, this sense of control over an uncertain reproductive future is particularly appealing (Hamper, 2020; Patel & Strong, 2025).

Apps also work on the assumption that self-improvement is possible, simply by quantifying the body into numbers and metrics, and tracking this ‘objective’ data for progress (Lupton, 2016). However, the ways in which numbers are interpreted and encountered are rarely neutral, and the frameworks they are embedded in are never innocent (Lupton, 2013). While a forensic analysis of the self appears to offer greater clarity and certainty, there is plasticity in human-technological engagement. More specifically, a dynamic and lively encounter occurs involving bodies, technology, affect, and discourse among many other elements, leading to certain kinds of experiences and lines of action (Lupton, 2019).

### ***Introduction to the Hormone Tracking Technology***

After discussing above Femtech and reproductive apps more broadly, I now turn to the more recent forms of hormone tracking technology that is looked at in this thesis. At-home hormone tracking technology draws on systems, such as data analytics, real-time monitoring, and machine learning algorithms, to produce highly ‘accurate’ information and predictability. For example, an AI aided saliva analysis of pregnant women has been able to predict 93.3% of baby deliveries within a three-day window (Li et al., 2022). Such technology works off the assumption that users will be more empowered in their fertility goals, simply by rendering the body as more knowable, and creating a high level of precision that users can act on.

The at-home hormone tracking technology also marks a trend towards understanding the body through fluids. More specifically, bodily fluids, such as urine, sweat, semen, saliva, and

vaginal mucus are used to intimately monitor intricate biological process and provide an alternative means to blood testing. For example, sweat has been used to monitor hormone fluctuations through wearable patches for real time fertility tracking (Lee & Gao, 2025). The technology used in this thesis allows users to track their own hormone levels through urine testing (Hills et al., 2023). The networked app and hormone detection technology makes previously hidden biological reproductive processes knowable (Hills et al., 2023). The technology marks a fundamental shift from the clinic to the home. In a sense, hormone testing once confined to a laboratory through blood tests is now carried out by people every day in their own home through urine (Hills et al., 2023).

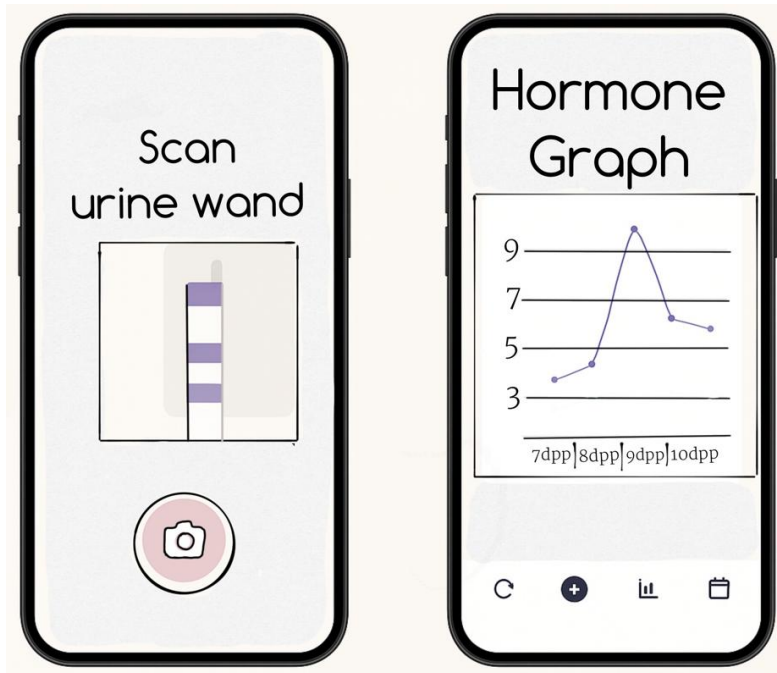
The technology examined in this thesis tracks the hormone progesterone (Proov, 2024). Progesterone is one of several reproductive hormones in the body that regulates fertility (Hills et al., 2023). Progesterone levels start off low in the menstrual cycle, and then rise in the second half of the cycle, also known as the luteal phase (Wegrzynowicz et al., 2022). Progesterone is an important hormone for pregnancy as it helps to create a thick and receptive uterine lining for the embryo to implant. It also supports the progression of an early pregnancy (Bernstein et al., 1978). Progesterone levels typically drop at the very end of the cycle to allow menstruation to take place. Whereas in pregnancy, progesterone levels stay elevated and continue to rise.

The specific hormone tracking fertility app system used in this study is called Proov (Proov, 2024). Proov monitors progesterone through Pregnanediol Glucuronide (PdG), which is a metabolite of the hormone progesterone found in urine (Beckley et al., 2022). More simply, PdG gives an indication of what a person's progesterone levels are and whether the body is

conducive to a pregnancy. For ease and consistency of this thesis, I use the term progesterone to cover both the terms progesterone and PdG.

The technology uses five hormone detection urine wands for one cycle. These hormone detection urine wands are very similar to an at-home pregnancy test. The first one of these progesterone tests is a 'baseline', which is taken early on in the cycle when progesterone is typically low. The technology uses this baseline to recognise a rise in progesterone later on in the cycle. The final four progesterone tests are carried out approximately a week after ovulation to detect a rise. These final four tests are carried out each day in a row as promoted by the app, creating what is described by the technology as the 'implantation window'. Four tests are required as opposed to a one-off test so that the technology can detect whether high levels are sustained. Sustained levels indicate that ovulation occurred and that the body is able to support early pregnancy development.

To read these hormone detection urine wands, the technology uses a smartphone camera to gauge the progesterone levels marked by lines (similar to an at-home pregnancy test). Once a urine wand has been placed into the user's morning urine for 10 minutes, the app scans the lines on this wand and places it into quantifiable data, such as numbers, graphs, and scores, which the user can monitor daily over the cycle to see whether ovulation has taken place (see Figure 1)



*Figure 1. Illustration of the hormone tracking app.*

Note. for clarity this is a conceptual drawing and not factual representation of the technology.

## **Chapter Two: Literature Review**

### **Introduction to the Literature**

The research on fertility apps is limited despite their increase in popularity. The research on fertility hormone tracking technology, such as Proov, is even more scarce. For this reason, I included research on traditional reproductive apps that include menstruation, pregnancy, and fertility tracking. In this review, I first explore the small body of work in relation to recent hormone tracking technology and identify significant gaps in understanding that this thesis addresses. Secondly, I review the literature on traditional forms of reproductive apps that do not use hormone tracking technology. For the first tranche of this traditional app research, I provide a brief critique on research aligned to the positivist tradition that is predominantly focused on the uptake of apps, accuracy of apps, and levels of fertility literacy of app users. I then look at the themes found from more in-depth qualitative based research as a basis for this thesis to build on. Finally, I make a case for using feminist new materialism theory in this research project by examining the literature which has used this theory.

### ***Hormone Tracking Technology***

There is very little research on reproductive apps in relation to urinary hormone tracking technology. What does exist is research designed to establish the validity of hormone tracking technology. For example, Mu and Fehring (2023) looked at the accuracy between the clear blue fertility monitor in comparison to an existing at-home Premom luteinizing hormone (LH) testing system. Pattnaik et al. (2023) and Usala et al. (2024) evaluated fertility hormone tracking apps for the accuracy and sensitivity of multiple reproductive hormones detected in urine compared to hormones in serum blood levels. Bouchard et al. (2019) and Wegrzynowicz et al. (2022)

determined whether at-home progesterone hormone tracking apps could predict the fertile window and confirm ovulation. Essentially these studies aimed to test the credibility of hormone tracking technology through comparisons. Since objectivity and validity are a primary concern in these studies, it is worth noting that a majority of the authors had a conflict of interest, such as being on an advisory board or being a company founder (Pattnaik et al., 2023; Usala et al., 2024; Wegrzynowicz et al., 2022).

Standing out from this small body of work is a large-scale quantitative study looking at Oova, a daily at-home hormone monitoring fertility app system involving several key reproductive hormones (Hills et al., 2023). The study demonstrated how real-time hormone tracking enabled users to pinpoint and predict exact phases within users' own cycles, and for each individual cycle as it is occurring. Findings indicate that there is variability of phases within the menstrual cycle across an individual's lifespan. More specifically, the follicular phase appears to shorten, and the luteal phase lengthens as an individual ages. Notably, these findings challenge existing research and discourse that locates age-declining fertility as a matter of egg quality and egg quantity. Specifically, rather than the egg being the problem, it could be that the fertile window shifts over time. Overall, Hills et al. (2023) offers a glimpse into the changes that are occurring with this technology and what new knowledge is being created. However, there is no understanding of what experiences are being created as a result of these changes.

Stujenske et al. (2023) sits in contrast for the questions it raises, rather than its contribution. The findings are somewhat unclear for research that bids for clarity through a positivist orientation. The study aimed to understand how menstrual tracking technologies are being used in the context of reproductive disorders, which again, does nothing to describe the

nature of experience that is created with technology. The large-scale cross-sectional survey found that the majority of women described in this study used menstrual tracking technology to avoid pregnancy (72.8%). A portion of women that used urine hormone testing was included and accordingly, it was concluded that women frequently used urine hormone testing to avoid pregnancy. While it is possible this is the case for the majority, a deeper dive into the sample and technology used suggests that this could be an overly simplistic explanation. In particular, the specific hormone tracking technology used by participants has been designed and marketed to increase conception chances, and 75% of the sample reported being infertile. Infertility is defined as actively trying to conceive for at least a year with no success (Balen, 2023). In other words, there appear to be contradictions within the study. Ultimately, it is possible that pooling together a large number of participants and different types of technology, and reducing the findings into one neat explanation could have absorbed any other complex or multilayered explanation.

Hormone tracking research tends to centre on ovulation as the main event (Ford et al., 2022; Kazakoff et al., 2025). Hormone tracking studies have predominantly focused on estrogen and luteinizing hormone, which are the specific hormones used to signify and predict the users' fertile window. While ovulation is an important part of the cycle and particularly relevant for those who wish to conceive, other hormones and parts of the cycle have been left underexplored. For example, there is no understanding of why 12.2% of the sample in Stujenske et al. (2023) used Proov progesterone testing technology. The finding that women frequently used urine hormone testing to avoid pregnancy does not make sense because this test detects a progesterone rise after ovulation in the second part of the cycle (Bouchard et al., 2019). More simply, this hormone has no predictive quality in the lead up to the fertile window, making it redundant for pregnancy prevention.

Overall, the small body of existing research on urinary hormone tracking technology is important, as users need to know that the technology is reliable and works in the way it is intended. However, findings appeared to be inconsistent with how the technology is marketed and therefore likely to be used. Importantly, a deeper understanding of what experiences are being created with this technology is clearly absent in the literature. Even though the literature on hormone tracking technology is limited, there is a body of research on more traditional forms of reproductive apps. I look at this research in the following section to explore existing themes, methods, and theory, as a foundation for this thesis to build on.

### ***Tracking Reproductive Bodies***

What follows is a brief critique of research aligned to a biomedical model and positivist tradition. I then explore critical scholars and research that takes a more in-depth approach to research. I discuss some of the key debates that are relevant to the progesterone tracking technology looked at in this thesis. In particular, I discuss the empowerment disciplinary tension and pedagogy features of apps. This is because the progesterone tracking technology looked at in this study operates on related assumptions, such as rendering the body into something knowable automatically makes it more controllable. I also touch on how traditional reproductive apps connect with ideas of a wider quantified self movement, as the technology explored in this thesis privileges metrics. While issues of predictability and data security are less relevant to this thesis project, I have included these contributions as context, because they are important debates in the literature. Finally, I discuss research that employs feminist new materialism to show why this theory is well-suited for this thesis.

## **Fertility Literacy**

Research aligned to a biomedical model and positivist tradition have centered on the uptake of reproductive apps (Gonçalves et al., 2021; Haile et al., 2018; Jukic et al., 2022; MacKrill et al., 2020); accuracy of app ovulation estimates (Bradley et al., 2021; Johnson et al., 2018; Johnson et al., 2020; Li et al., 2016; Moglia et al., 2016; Setton et al., 2016; Sohda et al., 2017; Symul et al., 2019); and levels of reproductive knowledge and literacy (Armour et al., 2021; Ford et al., 2022; Ford et al., 2020; Lemoine et al., 2021; Yokomizo et al., 2021). At the heart of this research lies an assumption that fertility goals can be achieved if women improve their knowledge and awareness. From this respect, fertility apps become a means to optimize reproductive outcomes.

For instance, Ford et al. (2020) and Yokomizo et al. (2021) looked at the association between reproductive apps and fertility knowledge through large scale studies. A strength of Yokomizo et al. (2021) was the design of the study, which included a randomized control-group pretest posttest study involving 4137 participants and one specific fertility app. In other words, a high level of experimental control was achieved in keeping with the meta-theoretical principles of the study (Crotty, 1998). Whereas Ford et al. (2020) conducted a one-time online survey, hypothesizing that women using reproductive apps in general would perform better in fertility knowledge questions. As a result, there is lower reliability and methodological rigour (Douglas et al., 2020). Despite these methodological differences, both studies found that fertility knowledge was higher in those who use reproductive apps. As a result, reproductive apps are concluded as a means to improve fertility literacy.

A limitation of Ford et al. (2020) in terms of this conclusion is that a majority (95%) of the sample reported *not* trying to conceive, and used menstrual tracking as a function of their reproductive apps. Therefore, Ford et al. (2020) makes an assumption that all women using reproductive apps should have greater literacy of fertility knowledge, yet it is possible that the women using these apps do not wish to have children at all, making fertility knowledge in relation to trying to conceive irrelevant. As this demonstrates, surveys are a limited method in the sense that there is no contextual understanding or opportunity to follow up responses when further questions are raised (Douglas et al., 2020).

Research of this positivist nature is aligned with healthism. Healthism is a neoliberal ideology that suggests health outcomes, such as achieving a pregnancy, are a matter of personal choice and individual effort (Riley et al., 2025). Aligned with this approach and more broadly an understanding that knowledge leads to appropriate action, literacy research has continued to highlight the benefits of improving fertility awareness for some time (Ford et al., 2020; Hampton et al., 2013). Yet, fertility levels continue to drop globally, and despite the escalating uptake of fertility apps (Baldwin, 2019; Rampazzo et al., 2024; United Nations Department of Economic and Social Affairs, 2022; World Bank, 2021). What this suggests is that fertility is far more complex than healthism allows. When Ford et al. (2020) and Yokomizo et al. (2021) frame the issue of fertility decline as a matter of raising fertility awareness, wider sociocultural factors are overlooked, such as the cost-of-living pressures in contributing to delayed childbearing (Baldwin, 2019).

When Yokomizo et al. (2021) suggests improvements in fertility literacy would help age-related fertility decline, an assumption has been made that infertility is due to a women's

reproductive age. The ‘biological clock’ is a strong discourse based on the fact that females are born with a finite number of eggs, as opposed to sperm which are continuously produced. However, the ‘biological clock’ is only one facet of fertility. For example, sperm concentration and total count has halved in the last forty years (La Vignera & Calogero, 2020), and 40% of infertility can be attributed to male factors (Brugo-Olmedo et al., 2001). Recently, an evidence-based guideline on unexplained infertility in Australia reported that up to 30% of infertility between heterosexual couples remains unexplainable (Costello et al., 2024). Therefore, a limitation of fertility research underpinned by healthism, is that it has the potential to burden women with the responsibility for learning about and solving fertility. When pregnancy is not achieved, despite improving their fertility literacy and monitoring, it could exacerbate an individual’s suffering.

### **Empowerment Technology**

Critical scholars have argued that reproductive apps may be empowering, yet they can also be disciplinary in the sense that they produce a particular understanding around what is normal, desirable, and needs managing (Epstein et al., 2017; Hendl & Jansky, 2022; Lupton, 2015b). On one hand, fertility apps provide users with the opportunity to learn about, predict and control their conception (Andelsman, 2021; Della Bianca, 2022; Hamper, 2020; Lupton, 2019; Riley & Paskova, 2022). In this way, users are empowered to take responsibility for their own health. On the other hand, they can increase self-surveillance, perpetuate social sex-gender norms, and create feelings of blame and anxiety by shifting the responsibility of fertility solely on women’s shoulders (Hajkova & Doyle, 2024; Hamper, 2020; Hendl & Jansky, 2022; Stenström, 2023; Tylstedt et al., 2023).

Central to the empowerment disciplinary tension is the concept of self-responsibility. Taking responsibility for one's own fertility is often framed as empowering in neoliberal settings (Hendl & Jansky, 2022). Yet, critical scholars point to how such responsibility can be burdening (Hamper, 2020; Lupton, 2015a, 2015b). For example, Hamper (2020) explored self-responsibility when looking at those who used fertility apps for the purpose of conception. Applying critical feminist theories of embodiment and materiality, Hamper (2020) interviewed 15 women on their experience and found that fertile windows did not simply exist, rather they required the ongoing labour of women in order to 'catch' ovulation.

Similarly, Grenfell et al. (2021) employed critical digital health studies to explore the experiences of women and their partners using an app (Natural Cycles) while trying to conceive. Grenfell et al. (2021) found that the fertility app demanded a strict schedule of the user taking temperature upon waking, with minimal body movements, no alcohol consumption, and at least three hours of rest. Such self-responsibility was further reinforced through data entries framed as rewards and achievements. Despite such adherence, participants took on blame for not conceiving, or felt conscious through the app's feedback that they were not doing the right things, "not using [the app very well]" (Grenfell et al., 2021, p. 122), or not doing enough to get pregnant. As demonstrated by Grenfell et al. (2021), a drawback of technology that feeds into neoliberal notions of self-responsibility is that the individual tends to fall into the default of being at fault or failing (Riley et al., 2018).

According to Lupton (2015a), reproductive apps work on the assumption that ideal user is willing and ready to produce detailed information about their reproductive capacities, where all aspects of one's life are geared towards optimizing reproduction. In Grenfell et al. (2021),

fertility apps were framed as a less invasive alternative to biomedical intervention by participants, yet the constant access brought fertility at forefront of everyday thoughts and actions. On one hand, the ease, familiarity and accessibility of apps is praised by participants for supporting them in fertility goals, yet the seamless integration into everyday life leaves little room for deviation from use as a consequence (Andelsman, 2021; Clark & Lupton, 2023; Grenfell et al., 2021; Hamper, 2020).

Underpinning neoliberal notions of empowerment is a belief that fate can be controlled, or at least altered, through sustained effort and action (Lupton, 2013). Participants described technology as giving them a new level of control over their reproductive functions (Andelsman, 2021; Grenfell et al., 2021; Hamper, 2020; Riley & Paskova, 2022). For example, participants described fertility tracking as a way to exercise control during an out-of-control situation (trying to conceive) (Hamper, 2020). Participants felt proactive when using apps, and at times this sense elicited excitement for the upcoming conception that laid ahead (Grenfell et al., 2021; Hamper, 2020). However, any sense of empowerment or control gained through tracking was spoiled when users did not fit the confines of the technology. For example, slight temperature fluctuations generated feelings of anxiety and stress for participants in Grenfell et al. (2021). In Riley and Paskova (2022) feelings of anxiety were generated when dis-preferred identities were created by apps, such as categorizing their cycle as irregular.

In a similar way, Hamper (2020) described a participant who had no fertile window to act on because the fertility app did not pick up a clear cycle. As a result, feelings of uncertainty and confusion were created, which stands in stark contrast to the clarity these tools promise to offer. Likewise, those who had been tracking for some time were confronted with a visual archive of

repeated failures (Grenfell et al., 2021; Hamper, 2020). In this way, a heightened awareness over the fertile window also means a greater awareness of an absent pregnancy. Collectively the literature points to how reproductive apps are largely a “one-size-fits all technology”, where empowerment is contingent on the user presenting with the right symptoms at the right time (Hamper, 2020, p. 23).

Feminist scholars have argued that apps perpetuate a moral obligation to participate in regimes of self-improvement (Ford et al., 2021; Hajkova & Doyle, 2024; Hendl & Jansky, 2022; Lupton, 2015b). For example, Hajkova and Doyle (2024) conceptualized reproductive apps as an instrument of self-surveillance used to enforce greater productivity. Grounding the analysis in a phenomenology of temporality and examining the vocabulary used in reproductive apps, Hajkova and Doyle (2024) argue that the experience of time of in a menstrual cycle is something to be lived through. Whereas the time discipline enforced through apps promotes a false sense of empowerment, acts as a constant call to improve productivity, and ultimately causes a separation between the user and their body. A limitation of Hajkova and Doyle (2024) is that it was confined to the conceptual analysis of reproductive apps only, as opposed to data collected from participants. Put simply, only one side of the practice of tracking is examined. Consequently, the findings are limited to a conceptual argument, and aspects such as the agency or resistance from users in the actual practice of tracking remains unexplored.

According to Lupton (2015b), women’s bodies are often conceptualized in terms of medicalization and risk. The intense surveillance is framed by apps as being in the best interest of the user, where better awareness over reproductive processes optimizes chances of conception. Yet, researchers oriented to a critical social constructionist tradition point to how such

surveillance produces the reproductive body as ‘risky’, particularly in the context of pregnancy tracking (Lupton, 2012, 2015a; Thomas & Lupton, 2015). For example, Thomas and Lupton (2015) used critical discourse analysis and found that pregnancy apps configured the pregnant body as a site of risk that needed careful self-surveillance. Similarly, Lupton (2015a) described how apps represent the body as a “vessel for the containment and nurturing of this [foetal] precious entity” (p. 7). In this sense, women are morally responsible for monitoring and managing their bodies for the sake of their unborn child. From the perspective of biopolitics, in which power operates through regulation, taking preemptive steps now through surveillance, is thought to pay off with a more desirable reproductive future (Foucault, 2008; Waggoner, 2015).

### **Pedagogy of Apps**

The pedagogical nature of reproductive apps is a key theme in research. Reproductive apps are frequently conceptualized as tools that empower users to take an active role in learning about their bodies, instead of having to rely on medical professionals (Armour et al., 2021; Ford et al., 2020; Gambier-Ross et al., 2018; Geampana, 2024; Grenfell et al., 2021; Levy & Romo-Avilés, 2019; MacGregor & Wathen, 2014). Although, critical scholars also argue how such shifts in responsibility can intensify healthism imperatives (Grenfell et al., 2021; Lupton, 2013). Essentially, the empowerment-disciplinary tension extends into the pedagogy aspects of reproductive apps.

Participants commonly described valuing apps for the new reproductive knowledge they acquired (Andelsman, 2021; Grenfell et al., 2021; Hamper, 2020; Levy & Romo-Avilés, 2019; Riley & Paskova, 2022). The pedagogy features enabled users to know their own bodies better and changed the way that they viewed their cycles and bodies. For Hamper (2020), participants

described gaining clarity over the body through the ‘science’ of conception. Participants also valued learning new technical jargon and medicalized terminology used to explain their bodies (Gambier-Ross et al., 2018; Grenfell et al., 2021; Hamper, 2020). In Riley and Paskova (2022), participants described this pedagogical experience as empowering, as the added information that they learnt about their bodies gave them a sense of control and confidence.

In Grenfell et al. (2021), participants turned to fertility apps as an alternative means to learn about their reproductive bodies, when health systems and educational systems in the United Kingdom were lacking. Women frequently described how fertility apps helped them to get to know their bodies in ways they had never been attend to, or taught about in other settings, such as school. In addition, women praised technology for giving them a space to be active while trying to conceive in contrast to the frustrating and common societal advice to just wait and relax.

In the shift from health professionals to lay people, the pedagogy features of apps feed into notions of self-responsibility (Lupton, 2013). Geampana (2024) made a valuable contribution by looking at the “data assemblages” forged through fertility apps. In contrast to research that has predominantly looked at the interplay between the app and the user, Geampana (2024) demonstrated how wider data assemblages of both expert and lay communities were brought together by fertility apps. In particular, using a critical data studies approach to fertility apps and an in-depth case study method, Geampana (2024) found fertility apps acted as a platform that connected multiple actors, and therefore multiple knowledge streams. As a result, certain public/private lay/expert networks were formed. For example, apps often employed scientific and medical jargon drawing on a positivist scientific base, yet they amplified the users

role in lay knowledge production by connecting them with lay knowledge exchange communities (i.e., social media sites and forums). From this perspective, knowledge is not fixed but constantly remade through various different knowledge contributors within an assemblage. Having this finding is important because it demonstrated how apps actively shape and produce knowledge through a broader network, employing and legitimizing certain knowledge bases over others.

Geampana (2024) found that while fertility apps empowered users in the role of lay knowledge production, users were also responsible for the continuous maintenance of data assemblages. In a similar way, participants in Hamper (2020) described a demanding climate of trying to relearn biology through apps, itinerising the body, and making sense of intersecting forms of knowledge, such as ovulation tests and bodily sensations. Ultimately, these components did not fall together neatly, and required a great deal of labour on the participants' behalf to make sense of their reproductive bodies. Together these articles demonstrate a drawback in self-responsibility. In particular, apps place high demands on users by encouraging them to take an active role in understanding and solving their own fertility.

In the context of pregnancy apps, Lindhardt et al. (2024) found that despite an abundance of reproductive information gained through apps, participants experienced a sensation of never knowing enough. Through in-depth interviews of seven pregnant women, Lindhardt et al. (2024) found that mothers were almost obsessed with observing, checking, and evaluating their symptoms against the information provided by pregnancy apps (Lindhardt et al., 2024). Similarly, Patel and Strong (2025) looked at existing data of online digital communities for those trying to conceive. Members shared pregnancy test line progressions in an effort to make sense of their bodies and to detect early pregnancy development. Individuals tested daily, sometimes

twice daily, tracking to see whether their test lines grew darker or fainter over time. Despite this activity, Patel and Strong (2025) found that the inevitable end of a chemical pregnancy (very early miscarriage) could not be prevented. Cumulatively, these two studies suggest that technology cultivates a false sense of control over reproductive processes, which are mostly uncontrollable. A false sense of control could be harmful in terms of the labour involved, and also by creating a sense of failure when things do not work out as planned.

Research has described feelings of reassurance from the pedagogical features of apps, particularly in the context of menstrual tracking (Andelsman, 2021; Karlsson, 2019; Levy & Romo-Avilés, 2019; Riley & Paskova, 2022). Riley and Paskova (2022) found a pedagogy of appreciation, where the menstruating body was seen as something to be appreciated, which worked to combat the shame and stigma around menstruation, particularly for women with premenstrual syndrome (PMS). The technology created an awareness over hormonal processes which worked to legitimize embodied experiences for participants. Accordingly, participants learnt that their premenstrual symptoms were a normal fluctuating part of the hormonal cycle through the pedagogy features of apps. In this sense, users could learn to appreciate their bodies without trying to change them, which is quite a contrast to healthism. Similarly, Andelsman (2021) found that when menstrual tracking apps gave users a means to access their internal body, the external existence resisted the social expectation to conceal menstrual periods. In Levy and Romo-Avilés (2019), participants felt reassured by the fact that they could verify unusual symptoms or subjective experiences against the information provided by menstrual tracking apps. For example, learning that wanting something sweet or salty is related to a phase in the menstrual cycle.

## The Quantified Body

According to Lupton (2016), apps participate in a ‘quantified self’ movement, where self-knowledge is gained through numbers and metrics. Technology shifts haptic or felt sensations and symptoms, and inner bodily workings into visible ways of knowing, such as numbers, data, and visuals. As a result, numbers allow users to make a comparison. Andelsman (2021) describes this as a “conversion of inner processes into actionable evidence” (p. 63). In this way, quantification buys into notions of empowerment. Self-improvement is assumed to be possible because this ‘objective data’ can be tracked for progress (Lupton, 2013). In this way, people can be proactive and work on their fertility.

However, reproductive apps do not innocently measure what exists or is real. Instead, several authors argue that quantification is both influenced by, and participating in the phenomena they are a part of (Andelsman, 2021; Hamper, 2020, 2022; Healy, 2021). In Andelsman (2021), measuring brought the menstrual cycle into a systematic series of intervals and phases. By making seemingly invisible temporal functions visible, the cycle was (re)configured in ways that users could access and act on.

The pleasure of tracking the cycle did not necessarily come from the perceived neutrality, accuracy, or objective nature of data. Rather, for participants in Andelsman (2021) it was the *visualizing* capacities, and the app’s ability to provide users with a “material record” or “overview” of their cycle (p.68). In other words, visibility gave external existence to the menstrual cycle. With respect to this, Andelsman (2021) proposes that reproductive apps ‘widen the human sight’s capabilities’ in ways that are similar to how medical technologies have done so in the past (p. 68).

The strength of Andelsman (2021) was the method used. In particular, users were invited to access their app during interviews, and to go through the features with the researcher. The closed nature of apps makes it challenging for researchers to explore their technical features (Light et al., 2018). Andelsman (2021) used an adaptation of a walk-through method to help shed light on everyday app engagement and practices, in terms of their materiality and affordances. Participants pulled up graphs, and visual patterns of temperature fluctuations, and colour coded symptoms, uncovering how these actors were all “working” together to configure the cycle (Andelsman, 2021, p. 62).

### **Predictability**

Reproductive apps provide users with the opportunity to predict their ovulation and plan for menstruation. Participants have appreciated the predictability afforded by apps because it creates a sense of control over reproductive processes (Gambier-Ross et al., 2018; Grenfell et al., 2021; Hamper, 2020; Hohmann-Marriott & Starling, 2022). A sense of predictability connects with Lupton (2015a)’s argument that apps promise to contain the messiness and unpredictability of the reproductive body through rational monitoring.

In menstrual app research, participants have reported pleasure and purpose in tracking, when the body’s interior processes were organized into a series of phases (Andelsman, 2021; Gambier-Ross et al., 2018). Participants felt more in touch with their bodies, and periods could be better planned for because they no longer came “out of nowhere” (Andelsman, 2021, p. 61; Gambier-Ross et al., 2018; Levy & Romo-Avilés, 2019; Riley & Paskova, 2022). In common with menstrual tracking research, ovulation predictions were also greatly valued by those who track for the purpose of conception, due to an ability to make decisions and act on this

information (Gambier-Ross et al., 2018; Hamper, 2020; Hohmann-Marriott & Starling, 2022). For example, ovulation predictions were windows of opportunity that could be acted on in Hamper (2020).

Reproductive apps have been criticized for their lack of transparency over their predictions (Earle et al., 2021; Hohmann-Marriott & Starling, 2022; Hohmann-Marriott et al., 2024). In addition, research has stressed that there are gaps in users' knowledge, in terms of how to interpret data and understand predictions (Hohmann-Marriott, 2023b; Hohmann-Marriott & Starling, 2022). Apps are also frequently marketed with scientific jargon that misrepresents their true capabilities (Earle et al., 2021; Starling et al., 2018). This is likely related to the fact that no regulatory body oversees the quality of reproductive apps. With respect to this, evaluation studies have reported that a majority (95% of 108 apps) reproductive apps do not have professional input or cited academic literature (Gambier-Ross et al., 2018; Nair et al., 2023; Robertson et al., 2023).

Interestingly, it was often important to participants that apps are “medically sound” (Gambier-Ross et al., 2018, p. 6), “data-driven”, and “proven” (Grenfell et al., 2021, p. 120). The scientific quantifiable features of apps were considered more reliable by participants (Freis et al., 2018; Gambier-Ross et al., 2018; Grenfell et al., 2021). Overall, reproductive apps operate under the guise of being a scientific and credible means of tracking the body, yet they may not produce reliable information, leaving users to navigate uncertainty and potential misinformation.

### **Intimate Data and Security**

To make a prediction, reproductive apps often require the sustained labour of data-entry over time to create an archive of reproductive data (Hamper, 2024). In the literature, participants

often volunteered intimate details, such as expected pregnancy dates or days of sexual activity (Lupton, 2015b; Thomas & Lupton, 2015). Any minor inconvenience or sacrifice was considered well worth the trade. For instance, a common finding in the literature is that participants willingly exchanged their data for improved access to fertility and pregnancy knowledge and information (Gambier-Ross et al., 2018; Hamper, 2022, 2024; Stenström, 2023).

Studies have identified significant risks in data security through data sharing and selling practices of the parent companies (Siapka & Biasin, 2021; Earle et al., 2021; Nair et al., 2023; Robertson et al., 2023). While researchers often frame data harvesting as a significant risk, participants frequently report indifference or acceptance for data harvesting (Gambier-Ross et al., 2018; Healy, 2021; Stenström, 2023). In some instances, participants even felt content with the idea of their data being “part of a faceless collection of data somewhere” (Stenström, 2023, p. 100). Data harvesting is not a focus of this research. However, the moral, ethical, legal tensions created around ownership and use of data points to the intimate and inseparable nature of the human-technological landscape. Also, how a whole industry has been developed around profitable ways of using data, making the practice of tracking never neutral. With this in mind, I now turn to literature that employs new materialism to explore such closely entangled relationships.

### ***Feminist New Materialism***

The boundaries between people and technology have become increasingly blurred. To understand such complex human-technology arrangements, some reproductive app researchers have taken a feminist new materialism perspective (Andelsman, 2021; Della Bianca, 2022; Hamper, 2020; Karlsson, 2021; Lindhardt et al., 2024; Lupton, 2015a, 2020; Riley & Paskova,

2022; Zampino, 2020). This approach dismantles the hierarchy between human and nonhuman entities, and reconstitutes notions of agency away from sentient intent. As a result, agency is not something possessed only by humans, and matter, such as bodies and technology, is not a passive substance subject to human manipulation (Barad, 1998; Lupton, 2019). Instead, both humans and technology co-constitute each other, and both participate agentially.

The concept of an assemblage is often used in the new materialist literature on menstrual apps to describe all the elements that bring an item into being (Della Bianca, 2022; Hamper, 2020; Karlsson, 2021; Lupton, 2019). For instance, Hamper (2020) explored the use of fertility apps through feminist new materialism and found that fertile windows were not fixed or preexisting, rather they occurred through an assemblage of health-promoting behaviours, ovulation tests, timing of sex, discourse, all aimed at ‘catching’ ovulation. Similarly, Karlsson (2021) looked at the knowledge production of menstruating bodies in relation to menstrual tracking apps. They argued that knowledge was not simply waiting to be discovered, instead it consisted of algorithms, app designers, blood, the stigma surrounding menstruation, the culture supporting this stigma, and the communal activities and stories told. Essentially sociomaterial scholars argue that it is through an assemblage of various nonhuman and human actors that the reproductive or menstruating body is materialized.

A novel opportunity to explore new and emerging assemblages is presented with new progesterone tracking technology. Even though this new materialist literature on reproductive apps is fairly current, there have already been huge developments in apps and reproductive technology (Stujenske et al., 2023). For example, the highly sensitive urine detection technology, real time tracking through graphs, and smartphone cameras have been introduced (Proov, 2024).

Overall, there are new sociomaterial arrangements that may uniquely participate in how reproductive bodies come to be known and are experienced.

A common thread in the new materialist literature was that an interpretive process occurred between lay (user) knowledge and expert (app) knowledge (Andelsman, 2021; Karlsson, 2021; Riley & Paskova, 2022; Zampino, 2020). One school of thought regarding the empowerment-disciplinary debate has been that apps aim to control women's chaotic bodies by privileging positivist scientific and data-driven knowledge over embodied knowledge and subjective experience (Hajkova & Doyle, 2024; Healy, 2021; Kressbach, 2019; Pantzar & Ruckenstein, 2015).

For instance, Hajkova and Doyle (2024) and Hendl and Jansky (2022) examined the discourses of empowerment used by reproductive apps using a critical social constructionist orientation. The methods involved analyzing online marketing material and statements used by app developers, as opposed to a study involving participants. Accordingly, Hajkova and Doyle (2024) argued that apps separate the user from the self-knowledge of their bodies, creating a false sense of empowerment. Likewise, Hendl and Jansky (2022) argued that any sense of empowerment or self-knowledge channeled through apps involves "bodily alienation" (p.41). By privileging scientific and data-driven knowledge, the body becomes an object of measurement as opposed to something felt and known intuitively (Hendl & Jansky, 2022).

It is widely agreed that apps certainly draw on the discourse that whatever is measurable and objective is automatically seen as more credible (Earle et al., 2021; Kazakoff et al., 2025; Lupton, 2016). However, cumulatively new materialist literature indicates that this is not so much a conflict, but rather an oscillating process of intra-action occurs. Users have built their

knowledge base through overlapping encounters and assemblages (Andelsman, 2021; Hamper, 2020; Karlsson, 2021; Lupton & Maslen, 2018; Zampino, 2020). Overall, comparing the different approaches to knowledge generation in the literature shows the benefit of a new materialist perspective. Specifically, there is a focus on the process of tracking, in terms of the flows and processes that take place. In the current climate, this perspective is useful as broader “data assemblages” exist, involving layers of different knowledge streams, such as online information and social media, in addition to app and bodily knowledge (Geampana, 2024).

New materialism supports the idea that knowledge production will always take place in relation to something or someone beyond discourse (Braidotti, 2018). For example, Andelsman (2021) found the target lengths of menstrual cycles for each participant varied as the duration emerged through participants’ unique engagement with the world, their preunderstandings, their own normative data calculated by the apps, their interpretive process, and their level of engagement and skill using the app. In the case of Hamper (2020), participants made connections between general reproductive knowledge to knowledge relating to their own individual cycle. Similarly, Zampino (2020) found users engaged in “reflexive tinkering” (p. 41), where the biological knowledge presented by apps materialized through their engagement with the world and their bodies, as they confirmed, rejected, and explained their sensations, and with fluctuating app engagement. In further support of this dynamic and relational process, many studies found that bodies “learned to be affected” (p. 42), as users became more sensitized to recognizing the various changes in their bodies in relation to their use of apps (Andelsman, 2021; Lupton & Maslen, 2018; Zampino, 2020). Collectively these examples demonstrated that objects or items, such as target cycle lengths or symptoms, do not precede their interaction, rather they occurred through engagement over time.

Collectively the sociomaterial literature argues that the practice of self-tracking produces agency that extends beyond human control (Andelsman, 2021; Della Bianca, 2022; Hamper, 2020; Karlsson, 2021; Lindhardt et al., 2024; Lupton, 2015a, 2020; Riley & Paskova, 2022; Zampino, 2020). Agency emerges, responds to, and is enacted with all actors in an assemblage (Bennett, 2004). From this perspective, reproductive apps are not neutral measuring apparatuses. Apps are agentic when they enable certain lines of action over others through their ongoing sociomaterial achievement relative to an actor. For example, in Andelsman (2021) and Zampino (2020) the body was broken down into a series of symptoms. In this way, apps suggested what sensations may be symptoms, and through the users tracking, relevant and meaningful patterns emerged as they engaged with the world. Essentially the affordances provided by apps are assumed to be situated and contingent on certain circumstances and different modes of engagement.

To further demonstrate the lively and dynamic nature of agency, Hamper (2020) described how fertility apps are a particularly ‘vocal’ technology. Notably, it was their timely advice that intervened with everyday routine. Hamper (2020) described how participants resisted the pushy advice from apps when they were shrouded in moral judgement. This moral judgement was partly brought into being through serendipitous engagement with the world. For example, a participant received advice to limit alcohol while celebrating at a wedding. At that moment, the advice appeared particularly judgmental and was therefore challenged. In this way, a new materialist lens moves beyond discursive approaches, which can oversimplify how participant’s respond in ways that accept, negotiate or resist app advice. In this example, it is the timely advice which brought this particular understanding and subsequent line of resistance into being. In this

way, Hamper (2020) demonstrates the dispersed nature of agency that can be found in a new materialist perspective.

A criticism of feminist new materialism is that descriptions can be vague and abstract, and there is no clearcut way of conducting research (Lupton, 2019). Equally this could be taken as advantage, as the flexibility afforded in this approach allows for a cross pollination of researcher backgrounds and frameworks which could lead to greater creative potential. For instance, Riley and Paskova (2022) paired feminist new materialism with post-phenomenology and as a result, a novel perspective was created that could attend to the individual subjective experience, while recognizing that this experience is materialized through a continuous and lively intra-active human-nonhuman relationship. Although from a feminist new materialist perspective, knowledge will always be partial, contextual and contingent on the enactments of agential cuts (Lupton, 2019). Therefore, it cannot simply be meshed with any viewpoint or theory, and researchers need to consider the study's overall coherence to use theory and concepts in a way that is complimentary.

### **Summary of the Literature**

There is practically no psychological research on the experiences of at-home hormone tracking technology. This is despite the technology being readily available, and likely to be used within a context of wider social expectation of self-responsibility for reproduction. Hormone-tracking research is very one dimensional in the sense that research is centered on gaining credibility for technology. This indicates that it is time for a different tact. One which favours human experience and depth over breadth, in order to more meaningfully understand the experiences that are being created through this highly sophisticated technology. Importantly,

what is missing in this knowledge generation is the users' perspective. Stujenske et al. (2023) illustrated the need for a more in-depth and nuanced understanding of what experiences are being created with this highly evolved technology and intimate level of self-monitoring. Hills et al. (2023) provides some insight as to which direction future research could take. More specifically, rather than locating research around ovulation or fertile window only, there are other reproductive processes and phases within the menstrual cycle that could uniquely participate in how bodies are understood and acted on.

In reviewing the literature on traditional reproductive apps, a key debate in the literature was whether apps were empowering or disempowering. This tension extended over matters of self-responsibility, lay user knowledge versus medicalized knowledge, and quantification of the body. At times, traditional reproductive technology has produced a sense of empowerment and appreciation, particularly through the pedagogy features. Yet, experiences of anxiety and disempowerment were created when users did not fit the confines of technology or outcomes deviated from expectations.

In reviewing the feminist new materialism literature, it is easy to see why this approach is useful in the current sociotechnical climate of fertility tracking. Specifically, it accounts for the dynamic and closely entangled nature of human-technological arrangements, which includes both discursive and material elements. It is increasingly unproductive to try and separate the boundaries between humans and technology. Instead, feminist new materialism theory has developed the literature further by attending to the agentic flows that takes place through the process of tracking. Ultimately, feminist new materialism considers multiple elements and actors

and is practical in this sense, because it offers a certain flexibility to move forward with this continuously evolving landscape.

## **Aims of the Current Research**

### ***Research Aim***

As found in my literature review, there is practically no psychological research on the experiences of at-home hormone tracking technology. Therefore, this research aims to address the current gap in knowledge about how users experience at-home progesterone tracking technology when trying to conceive. Foregrounding the perspectives of women who are trying to conceive and locating these within the wider discursive and material assemblage within which this occurs, my study aims to explore how the introduction of progesterone tracking technology participates in producing new ways of knowing, feeling, and experiencing the reproductive body.

### ***Research Questions***

How can feminist new materialist approaches be used to better understand the experiences of using progesterone tracking technologies when trying to conceive?

Sub questions:

1. How is agency enacted through new progesterone tracking assemblages?
2. How does progesterone tracking participate in the ways reproductive bodies are known and experienced?
3. How does affect circulate? What are the feelings and emotions produced through progesterone tracking technology while trying to conceive?

### **Chapter Three: Methodology**

The following chapter outlines the methodology of this research. I first discuss the theoretical features of feminist new materialism that is used as a framework for this research, and then reflect on my position to provide additional context for this research. I then outline the methods used to carry out the research, including recruitment, data collection, data analysis. I provide a rationale for using reflexive thematic analysis informed by feminist new materialism theory. Following this I discuss the ethical considerations and lay out the quality criteria used to uphold the quality and rigour in this research.

#### **Theoretical Perspective**

While there is no set formula for conducting qualitative research, the framework should be purposeful and considered. As Crotty (1998) argues, the choice and justification of the theoretical perspective taken centres on the research question. In other words, the framework helps to deliver the research objectives. The aim of this thesis was to better understand the experiences of using progesterone tracking technologies when trying to conceive. To achieve this, feminist new materialism was used because, when applied to these questions, it enables exploration of how feelings and experiences are materially and relationally brought into being through people, technologies, and hormones.

#### ***Feminist New Materialism Theory***

In reviewing the literature in chapter one, feminist new materialism offered important insights into the complex and lively entanglement of human-technological relationships. For the current technological climate, the theory seems particularly fitting. More specifically, recent

technology has become a networked system of urine, hormone detection wands, smartphone cameras, graphs, and hormones, in conjunction with smartphone applications. Feminist new materialism can theorise the relationships within, and between, all these actors and their entanglement (Barad, 1998).

To understand the ‘matter’ involved in human-technological arrangements, I looked at the situated practice of progesterone tracking. This is because from a new materialist perspective, everything is shaped in relations and is locally situated (Barad, 2007). The theory rejects any separation between the object and the subject, or the mind and the matter (Fox & Alldred, 2017). Instead, all feelings, thoughts, and understandings are shaped by the world and in turn, these have material effects on the world. Essentially, everything is made to be meaningful through their entanglement with one another.

In terms of this entanglement, Andelsman (2021) describes how ‘the material arrangement of a specific measuring device in association with the object *produces* the object’s boundaries and the parameters of the object measured’ (p. 58). In taking this perspective, items such as fertile bodies, bathrooms, urine, are not stable pre-existing entities, rather they are constantly being reconfigured or created through practices involving multiple actors in an assemblage (Law, 2010). For instance, using a bathroom to produce a urine progesterone test would be different from using a bathroom to simply relieve the bladder. In this research, hormone tracking fertility apps systems are not conceptualised as neutral tools used to record or measure inherent properties of the body. Instead, fertility apps are understood as sociomaterial phenomena embedded in the practice of tracking and constantly open to possible rearrangement.

There are a variety of viewpoints, terminologies, and disciplinary orientations taken in new materialism. For example, a criticism raised is that the ‘new’ is an inappropriate descriptor given that many Indigenous groups have long featured relationships, interconnectedness, and the agency of nonhuman entities (Rosiek et al., 2020). Others have countered that the ‘new’ does not refer to the theoretical approach, rather the ‘new’ kinds of materiality (Stephens, 2014). In this research, I take the latter definition when using new materialism in this research. While the ‘new’ could be taken as a break from previous theories of embodiment and subjectivity, there is actually more continuity that this title pays (Lupton, 2019). For instance, new materialist scholars build on the lineage of theorists such as Spinoza (1632–1677), Merleau-Ponty (1908-61), Foucault (1926–1984), Latour (1947–2022), Deleuze (1925–1995), and Guattari (1930–1992). While the different perspectives of new materialism are beyond the scope of this thesis, I find it interesting that different schools of thought have reached similar understandings and shared concerns through different pathways. Finally, given that there is such diversity, I lay out the key concepts and foundational assumptions used in this research in the following sections.

### ***Ontology and Epistemology***

Defining the ontology and epistemology for this research is foundational. Essentially, these are assumptions about the nature of reality and what can be known (Crotty, 2020). The reason they are foundational is because they act as ‘regulatory principles’, in the sense that they provide a rationale for the choices made, and they can be used to achieve research coherence (Crotty, 1998). Simply put, ontology concerns the nature of reality, and asks what is reality (Crotty, 2020). Epistemology is concerned with what is possible to know, and asks the question how can I know reality.

Feminist new materialism assumes that a real world exists, yet this reality is constantly being enacted and shaped as both human and nonhuman entities encounter one another (Barad, 2007). Moreover, practices of knowing and being are deeply entangled as people enact, or rather reconfigure, their reality through their unique engagement with the world (Barad, 1998). Barad (2007) uses the term ethico-onto-epistemology to indicate the inseparability of ethics, ontology and epistemology (Lupton, 2019). As Barad (1998) argues, responsible intra-action means recognizing humans do not act in isolation, and that ‘becoming of the world is a deeply ethical matter’ (Barad, 2007, p. 185). Taking this perspective, the ethical considerations and quality criteria in terms of impact and contribution are further expanded on in this chapter. In addition, I have taken a reflexive approach throughout the research process, recognising myself as the researcher is part of the research assemblage and knowledge creation process.

In this research, I take a new materialist perspective in the sense that reality is constantly being reconfigured and enacted (Barad, 1998). It is important to take this perspective so that the agency of non-human elements, such as hormones and technology, are accounted for. Matter and meaning are also assumed to be in a constant state of becoming. Taking a relational ontological approach also shifts the focus from what things ‘are’, towards what matter ‘does’ in terms of the flows and processes that takes place. Barad describes this as ‘not a thing but a doing, a congealing of agency’ (Barad, 2007, p. 183). I see this as a productive and pragmatic way to approach this research, because recognising how experiences and lines of actions are enacted provides a basis for future change. For example, altering a negative experience through the removal of certain actors in future technological arrangements. Overall, feminist new materialism theory was used to meaningfully frame the experiences of recent human-technological relationships, along with the following concepts.

### ***Concepts Used in this Research***

In the following section, I describe some of the theoretical concepts that are used in this research. From a Baradian perspective, the concepts of assemblage, intra-action, apparatus, agency, affect, and interpretation make up what can be thought of as a particular conceptual apparatus. This apparatus enabled me to explore the research questions through different lenses, and when combined, they shaped the methods of data collection and analysis.

#### **Assemblage**

The concept of an assemblage is used to describe all the various components that create or materialise an item (Lupton, 2015a). Essentially this concept supports the notion that nothing exists in isolation. Each human and nonhuman actor, such as technology or metrics, plays an active role in producing an item. For this research, several actors have been introduced in recent reproductive app systems, such as the hormone progesterone, smartphone cameras, new testing windows, hormone graphs, and new benchmarks or scores (Proov, 2024). Essentially it is these new arrangements that could uniquely participate in how reproductive bodies come to be known and are experienced.

The fluidity of an assemblage is an important feature. Drawing on Deleuze & Guattari's assemblage theory, phenomenon consists of shifting, relational parts rather than fixed preexisting entities (Deleuze & Guattari, 1987). Experiences and actions are not reduced to simple modes of cause and effect, rather an assemblage operationalizes a dynamic grouping of forces. As a result, reproductive bodies are not defined by what they are, but rather how they relate and function through various nonhuman and human entities. Importantly, assemblages vary across place and time, making this concept useful for examining the current context of those trying to conceive.

Specifically, a blend of locally situated cultural norms, health systems, and practices make up contemporary reproductive experiences within Aotearoa New Zealand.

### **Apparatus**

Karen Barad's new materialist concept of an apparatus is useful to conceptualise the practice of progesterone tracking (Barad, 1998). The apparatus is not simply an instrument that neutrally determines a particular outcome (Barad, 2007). Instead, the boundaries of the measuring instrument and the object are enacted through the actual practice of measuring itself; they co-constitute each other (Lupton, 2019). To illustrate, a 'fertile window' is not neutrally disclosed by hormone tracking technology as if it were a fixed inherent property of the body. Rather the actual practice of tracking this window produces that idea and understanding of the fertile window. Overall, theorised as an apparatus in an assemblage is the practice of hormone tracking as a mutually co-constitutive process, which forms the boundaries and parameters of the user's body being measured.

### **Agency**

The intra-active process of self-tracking produces agency that is beyond human control (Barad, 2007). The distributed and composite nature of agency from a feminist new materialist perspective is distinct from ontologies that suggests that agency is directed or possessed by humans (Lavery, 2003; Lupton, 2019). Agency, from a new materialist perspective, emerges, responds, and is enacted by all actors within an assemblage (Barad, 1998). More simply, both humans and non-human entities have agentic properties. It is the lively and dynamic engagement of these actors which sets up certain lines of actions over others. For example, in Andelsman (2021) and Zampino (2020) the body was broken down into a series of symptoms. In this way,

apps suggested what sensations may be symptoms, and through the users tracking, relevant and meaningful patterns emerged as they uniquely engaged with the world. The affordances provided by apps are situated and contingent on certain circumstances and different modes of engagement (Lupton, 2019). Ultimately, taking this perspective on agency is important for this research to recognise the lively and unpredictable nature of human-technological arrangements. It means that non-human actors, such as graphs or the hormone progesterone, are recognised when they intervene with participants' experiences in lively and dynamic ways, and ultimately, that humans or technology do not operate in isolation.

### **Intra-action**

Relating to agency, intra-action is an important new materialist concept employed in this research (Barad, 1998). The term intra-action was coined by Karen Barad (1998) to mark the distinction from interaction, which suggests exchanges are causal or linear. Instead, intra-action is intentionally used to account for the complex and lively engagement, where several components come together and bring items or objects into being (Barad, 1998). In looking at existing research, new materialist perspectives found that the knowledge presented by apps is materialized through an intra-active process, involving participants' unique engagement with the world and their bodies, as they confirmed, rejected, and explained their sensations and symptoms (Andelsman, 2021; Hamper, 2020; Zampino, 2020). Collectively, new materialist literature demonstrated how items or objects did not precede their intra-action, instead they emerged through a lively process of intra-action over time. Overall, intra-action is a concept used to capture the agential capacities of all the elements as they encounter one another within an assemblage.

## **Affect**

To understand the lived experiences of those who are trying to conceive, it was important to attend to the affective elements. Feelings and emotions are widely conceptualised as something personal and internal to the body. In this research, I conceptualise affective experience as part of a continuum between the person and their environment. From this respect, affect is produced from both external and internal elements and is thought to be in a constant state of flux (Deleuze & Guattari, 1987). For instance, hope was a central motif in this study's findings, which I theorise as not reduced to an internal feeling, rather the state can be materialised through internal (e.g., thoughts and desire) and external (e.g., technology and discourse) relationships, and its nature can be tied to external items (e.g., graphs). Overall, in this research, the focus is not so much on what feelings are, but rather how certain affective experiences are materialised through the practice of progesterone tracking, and what kind of agentic flows take place.

## **Interpretation**

Given that I was looking at the subjective, often emotionally charged nature of a trying to conceive experience, I borrowed interpretive concepts to carry out the sense-making of this topic. The benefit of a new materialist perspective is that there is a certain flexibility afforded in this theory, where the cross pollination of concepts can lead to greater creative potential (Lupton, 2019). In common with new materialism, interpretivism assumes that reality is always situated and inseparable from context (Laverly, 2003). However, I do not assume in this research that reality can only be accessed through interpretation, rather I use interpretation to facilitate empathy and depth of meaning making in the analytic process. In this sense, the interpretive act

is performative and therefore enacted in knowledge generation. Adding an interpretive element in the analytic process enabled me to meaningfully engage with the subjective, often emotionally charged, lived experience of those who are trying to conceive. This was important to gain as these are the people using the technology.

### ***Agential Cuts and My Position***

While reflexivity is discussed in depth at later section, I discuss Barad (1998)'s notion of 'agential cuts' here, as this is a significant part of the ontological and methodological orientation of this research. Up until this point, the theoretical perspective could seem like a case of 'anything goes', or 'where does it stop?' if everything is considered connected and significant. This is where the concept of agential cuts and the role of the researcher in this framework is key. According to Barad (1998), researchers make a series of 'agential cuts' when deciding what to study and how to interpret the findings. Essentially, these cuts are the lines drawn in order to carry out the research, recognizing that phenomena will always be entangled, and these lines can be thought of as momentary stabilizations.

In this research I assume that there is a reality, and this reality changes depending on the particular vantage point. Tracking menstrual cycles and reproductive phases is not merely a mirror reflection of what is happening inside a body. Instead, this is real phenomena that is occurring at a particular point in time, which means the boundary making process of the researcher is also a co-constituting practice enacted in the research (Fox & Alldred, 2017). More simply, the researcher is part of the research assemblage. Therefore, to understand the phenomena of interest, it is essential that I reflect on my own position in relation to the research, and how the agential cuts I have made are enacted in this research.

In this study I have brought certain assemblages and relationships to light for meaning making, while others have been 'cut' away and excluded. To add context to this research project, I unpack my relationship with the trying to conceive community and the hormone progesterone in the following section.

### **Trying To Conceive**

I have lived experience of trying to conceive and fertility difficulties which means I have insider status. As someone with history in this space, when I read existing research it felt as though the feelings, such as anxiety and hope, when trying to conceive were underplayed for this community. As a result, it felt important to attend to affect in this research and bring to light how such experiences are materialised through technology.

There is a wide continuum of fertility difficulties, and I identify more strongly with someone who has experienced pregnancy loss. Interestingly, all the participants in this study had experienced at least one pregnancy loss before. This was not intentional at all, and I see this as an example of how intrinsically involved the researcher is in the research assemblage. For instance, it is possible that the way I knew about progesterone based on my own experience of recurrent loss is similar to how these participants came across progesterone, and is what interested them about the study. In other words, the hormone progesterone presented a new possibility for resolving issues of loss. In this way, the hormone progesterone forms connectedness between myself and the participants.

## **Progesterone**

The hormone progesterone has certain significance to me. I think of progesterone as the ‘nicer’ hormone where the higher the level the better. This is in contrast to other hormones, such as estrogen, where higher levels have been linked to endometriosis (Chopra, 2020). Or, follicle stimulating hormone, where a delicate balance is needed for egg maturation, that can be likened to achieving the perfect ripeness of an avocado. Mostly, I understand progesterone as a lucky hormone, or a ‘golden ticket’ hormone. This is because in the context of my recurrent pregnancy loss one of the items to first rule out is the level of progesterone in the luteal phase. If it is low, it is usually easily treated with very little risk or cost. In this way, I had hoped for low progesterone so that it would be an easy explanation and a straightforward fix. As a result of this engagement, I knew of its significance and role which led me to this research. In reflection of all the research that is predominantly centred on ovulation or luteinising hormone (the ovulation hormone), and given my unique engagement in the world, it makes sense why I became more interested in shedding light on other phases and hormones in the cycle that had largely been ignored.

## **Bracketing**

Bracketing, borrowed from the interpretivist traditions, is the deliberate suspension of the researcher’s beliefs, preunderstandings, and preconceived ideas (Laverty, 2003). Laying out my positionality in this research has enabled me to bracket prejudgments and preconceived ideas during the analytical process. Bracketing was not used to exclude my influence from the research, but rather to see if there were alternate ways of interpreting the data. In this way, bracketing can be aligned to a new materialism perspective because the researcher is active in this process, setting up certain lines of understanding based on the decisions made in this

process. Bracketing was particularly important in this research because of my lived experience, and the fact that research should aim to speak more to the participants' experiences than simply reproducing my own understanding. More simply, the purpose of the research is to learn something new.

In summary, my positionality in this research is important as it provides a deeper contextual understanding of the research for the reader. Explicitly laying this out also calls for me to be intentional and reflexive in my assumptions and preconceived ideas throughout the research process. In this way, I am an active participant in producing understanding, as I have engaged with the study based on my own preunderstanding, and what I have learned about myself and the world. Certain questions, for example, would have occurred to me based on this experience, thereby shaping the research process. Overall, my unique understanding of progesterone and my experience of trying to conceive, has participated in shaping this research design, the choices made, the quality of the relationships made, and ultimately, what analysis and knowledge has been created in the process.

## **Method**

### ***Research Design***

I employed an in-depth qualitative research design informed by feminist new materialism to explore the subjective experiences and meaning making of participants who were trying to conceive. This design was chosen as it addresses the lived experience of tracking as an embodied, relational, and affective process. Using both diary entries and interviews, the design attends to the complex entanglements that occur through progesterone tracking, and over the course of the cycle.

## Diary Entries

Diary entries through WhatsApp messaging were used to capture significant moments of participants' progesterone testing over the course of their menstrual cycle. Diary entries were suited for exploring the daily experiences of participants, because the immediate thoughts, emotions, and feelings could be recorded in the moment, without much retrospection (Bolger et al., 2003). In this way, the diary entries enabled me to capture key moments of engagement in the tracking assemblages that mobilised certain experiences. These moments of hot cognition in relation to other items, such as progesterone results, were important to gain in terms of the research question (i.e., affective experiences).

Text messaging is also a great method for opening up conversations around difficult or sensitive issues, such as trying to conceive (Gibson, 2022). This was an important consideration to gain depth of participants' affective experiences. Relatedly, the diary entries helped form a quality researcher-participant relationship, involving trust and rapport, which was important groundwork for rich knowledge creation during the interview process (Sullivan et al., 2024).

As part of these diaries, participants were asked to screenshot their app hormone graphs and any other features they engaged with. This draws from Light et al. (2018)'s adapted walkthrough method for mobile apps, where the features, visuals, and flows that take place are observed by the researcher during in-person interviews, as a way for researchers to respond to the closed off nature of apps. Light et al. (2018)'s adapted walkthrough method is grounded in a relational ontology which makes it also fitting for the purpose of this research. My study was limited to online engagement, however I created something similar by drawing on Light et al. (2018)'s method. Ultimately, these features helped contextualise participants' feelings and

experiences, which was important for myself as the researcher enacted in the knowledge generation assemblage.

## **Interviews**

Semi-structured interviews were used as a method of data collection for participants' experiences of progesterone tracking. As explained by Hugh-Jones and Gibson (2012), semi-structured interviews follow a flexible, partially predetermined structure, helping to guide the discussion between researcher and participant. A semi-structured interview was fitting for this research as I was able to visit certain topics that would help answer the question, yet there was flexibility so that the uniqueness of each participant's experience could be explored in depth (Mann, 2016). An interview schedule was designed to cover topics which would help answer the research questions (see [Appendix E](#)). Importantly, an in-depth interview with semi structured questions maps onto other highly theoretically informed research, exploring the dynamics between bodies, identities, and reproductive health technology (Riley & Paskova, 2022). Finally, photos shared through diary entries were reflected on during the interview. A benefit of using photo elicitation is that it can help facilitate the interview process, and often evokes emotive and rich data (Riley & LaMarre, 2023).

## ***Recruitment***

I aimed to recruit a sample of six participants to gain an in-depth account of their experience. I made this decision based on the resources and time allocated for a Master's research project, the feasibility of working with menstrual cycles (individual variability and duration), and the theoretical perspective taken. I aimed to recruit a diverse range of experiences, including Wāhine Māori and those from ethnic or sexual minorities.

### ***Inclusion and Exclusion Criteria***

To ensure the data was rich and meaningful, I recruited those who would benefit most from this study, and those who were actively attending to their fertility. To achieve this, I set the following parameters:

- Participants live in Aotearoa New Zealand.
- Have a menstrual cycle.
- Aged 30 to 35 years.
- Actively trying to conceive for the last 6 to 12 months.
- Tracking peak fertility or ovulation for conception purposes (required by the Proov app).
- Not using progesterone related hormonal medication, such as the birth control pill which can interfere with test readings.
- Have a smartphone.

The above criteria were carefully designed in a way that would answer the research question meaningfully, while also meeting ethical and moral obligations. Specifically, the criteria ensured participants were not at a point of desperation or heightened distress, and that the progesterone feedback provided by the apps would be valuable to them regardless of the reading (i.e., high or low progesterone). For a detailed discussion on the rationale of this criteria, please refer to the ethics section.

### ***Participants***

A final number of five participants who were actively tracking their fertility and trying to conceive were recruited. A total of six participants was initially recruited, however one participant dropped out after the first baseline test and was therefore excluded. In reviewing this

sample size, I decided that there was ample data to work with given that data collection had occurred through ongoing diary conversations over the menstrual cycle, in addition to rich in-depth interviews.

All five of the participants included in this study had experienced at least one miscarriage, and four of the participants were trying for their second living child. Participants ranged in age from 30-35 years, and all identified as white able-bodied cisgender women. Four participants identified as European Pākehā, one as South African. In line with the theoretical orientation and goals of this study, this contribution does not intend to generalise. Therefore, these were the only demographic statistics noted and are used only to contextualise participants' meaning making. To contextualise the participants within their own trying to conceive assemblages, I have outlined below brief deidentified vignettes of these five participants using pseudonyms.

### **Lucia**

Lucia is 32 years old and has a three-year-old daughter, who she very much wanted to give a sibling. She has a science background and describes herself as a “pretty black and white girl”. She works full-time, describes leading a healthy lifestyle, and goes to the gym most mornings. She and her partner had been trying to conceive for around eight months. She had a miscarriage recently in December, and while this was a difficult experience, she saw this as encouragement in the sense that she could at least conceive. She had been hoping to get pregnant before August (which she did!), which was a mental deadline she made based on when her last pregnancy that ended in miscarriage was due.

**Deirdre**

Deirdre had just turned 35 years. She has two children already including a young toddler and works part time. She came from a large family herself and always imagined having a large family, wanting at least one more. She recently lost a baby boy early in the year around 12 weeks, which was a really difficult experience. In a sense, he has been part of her journey since, participating in both happy and sad milestones, creating what she described as “split feelings”. She has recently been trying to get back into the gym and get back to her healthier lifestyle before this miscarriage happened. She has always been interested in health and works as a healthcare professional. I still feel moved by the highs and the lows I got to witness while being a small part of Deirdre’s journey.

**Janine**

Janine is a very bubbly 33-year-old who works full time. Janine and her partner have been trying to conceive for 12 months after taking a long break. She has experienced a pregnancy loss and described wanting to support research that looks at the psychological side of trying to conceive, as she felt the health system had treated her and her partner “as a number”. She and her partner maintain a “conception friendly lifestyle”, where they rarely drink, eat sushi or soft cheeses. She has a “furbaby” and describes how her and her partner direct all their love and attention towards this lucky rescue dog in the absence of a baby.

**Kylie**

Kylie is 30 years old and works full-time as a healthcare professional. She has been trying for her second baby in the last year and unfortunately had a miscarriage during this time.

She has polycystic ovary syndrome (PCOS), which can cause irregular menstrual cycles and ovulation. Because of this reproductive issue, she described starting her family earlier so that she had time on her side. Her fertility concerns were mainly around “wonky” hormones, which can be caused by PCOS, and also they went a bit wonky after her recent miscarriage. I really felt for Kylie and all that she had been holding on to internally, and I learned so much from Kylie in our time together in this research project.

### **Claudia**

Claudia is a 30-year-old in the performing arts sector, who has been trying for her first baby for at least six months. She has endometriosis, which she explained is an estrogen dominant issue that can sometimes be offset by low progesterone. She described that her difficulty was not around ovulation or conception. She had two recurrent miscarriages and wondered if the cause was low progesterone which lead her to this study. She described how her general practitioner was unable to clarify these suspicions due to the variability of progesterone over the cycle. However, they planned for her to take progesterone support once she conceived her next pregnancy as a precaution. A lot of Claudia’s experience resonated with my own experience, which added depth to the data collection process.

### ***Procedure***

Participants were recruited through online communities, such as social media fertility groups in Aotearoa New Zealand, and Massey University postgraduate online community groups. In addition, physical flyers were shared in public spaces including supermarkets, public libraries, support services and public fertility systems, such as Te Whatu Ora Fertility Plus and Fertility NZ (See [Appendix A](#) for Recruitment Advert). Participants that met inclusion criteria

were invited to read the information sheet (see [Appendix C](#)), which also included support resources. I invited interested participants to a one-on-one online ‘meet and greet’ Zoom meeting, to discuss the study further and to provide participants with the opportunity to ask further questions. At the end of this meeting, I encouraged interested people to have a think about whether they wanted to participate and to reach out through email if they wanted to proceed.

Once participants expressed interest and provided a signed consent form, they provided details of their menstrual cycle (i.e., when their next menstrual cycle was due), and downloaded the Proov app, which monitors and interprets the progesterone test wands (see chapter one for more detailed information of how the technology works). Participants were each sent a Proov progesterone testing kit, consisting of five hormone detection wands, to conduct at-home hormone testing throughout one menstrual cycle while trying to conceive (see chapter one for a more detailed introduction to the technology). Given that menstrual cycles are variable in nature, and each participant would be at a different time in their cycle, I set up a “moving” schedule to follow (see Figure 2 as an example of one participant). This schedule enabled me to know when I could expect diary entries, and to follow up participants when I had not heard from participants during expected times to ensure they were ok.

Name:	Dedire	Expected start: 25th Start: 28th May	Not Test Days Peak	<b>Data Collection Complete ✓</b>				
Period day: 28th May	Baseline (day 5/6) –	Peak day Uses LH tests	+1 +2 +3 +4 +5 +6	<i>Proov</i> 7DPP	<i>Proov</i> 8DPP	<i>Proov</i> 9DPP	<i>Proov</i> 10DPP	<i>Interview-</i> <i>cycle day 27</i>
Cycle Day	Expected: 3rd June ✓	Expected 9th Peak: 10th June		Expected 15th 16/6	17/6	18/6	19/6	Emailed for time 20/6 Interview scheduled: 23/6 complete ✓
Date	3/6	10/6		16/6	17/6	18/6	16/6	20/6
Result	Negative (as should be )			Strong Positive	Strong Positive	Strong Positive	Inconc. Emailed: positive	Koha sent ✓
Diary Entry	yes	yes		yes	yes	yes	yes	yes
Diary pics	screenshot	screenshot		screenshot	Yes pic of kids	Tampon	Screenshot + score	Preg test

Figure 2. Example participant data schedule

Note. DPP refers to days past peak fertility or ovulation.

After participants logged day one of their cycle (start of menstrual period) in their Proov app, the technology prompted the user to test at certain times of the cycle. There were five progesterone tests (i.e., urine hormone detection wands) carried out in total, and a diary entry was carried out directly after each test in reflection of the process and the results. Diaries were sent in text form through WhatsApp, with the option to include video messages. I provided prompts as necessary to help participants reflect on their feelings and experiences, to clarify what was happening for participants, and to gather rich data. A majority (four) of these diary entries were carried out in the second half of the cycle, which the technology termed the ‘implantation period’, approximately one week after ovulation occurs. I created a visual overview of the testing and data collection process (see Figure 3), and I outline some key tests and steps below in reference to this image, which occur in chronological order.

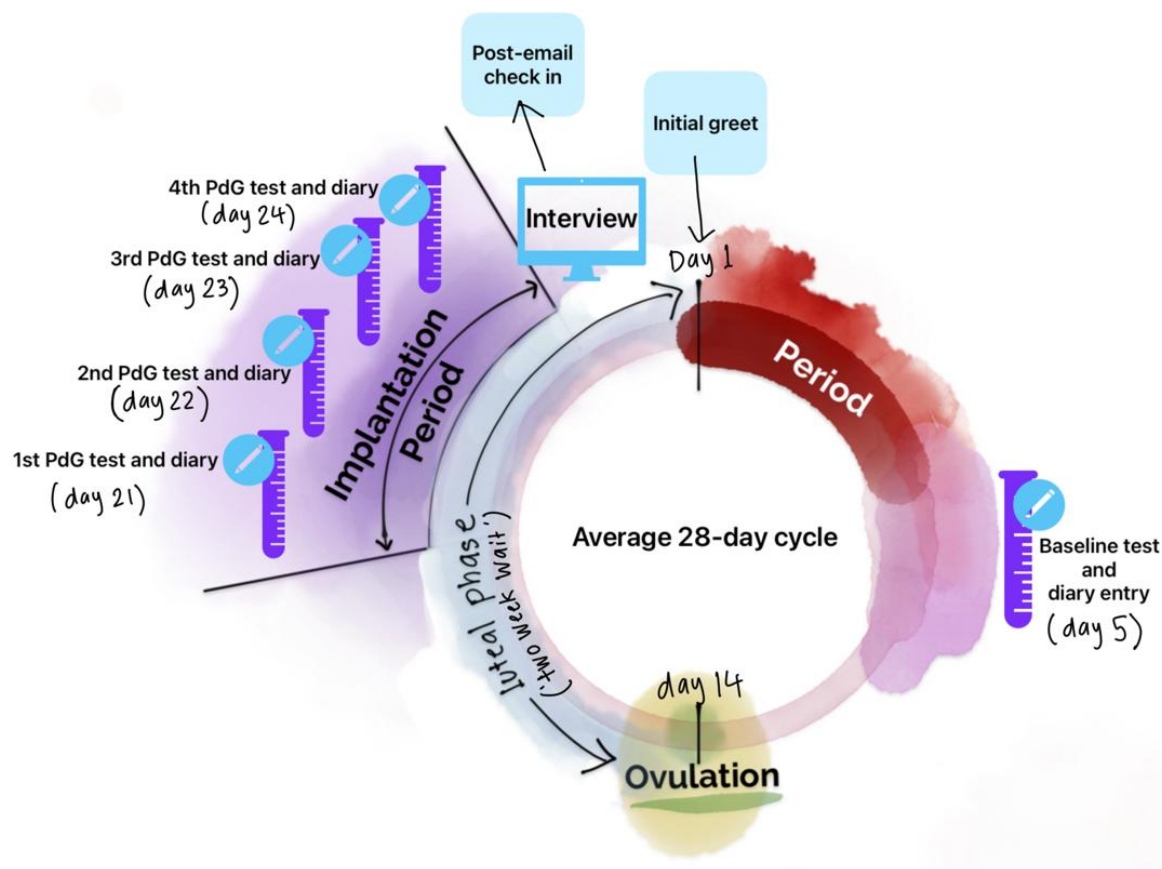


Figure 3. Overview of testing and data collection process based on a 28-day cycle.

Note. Cycle day one is the first day of the menstrual period.

### Baseline Test Data Collection

The baseline test was used by the technology cycle day five to gauge a baseline level of progesterone, so that a progesterone rise could be detected later on in the second half of the cycle. Participants used the first morning urine, and followed the steps as prompted by the app to gain a progesterone reading. Participants provided a diary entry through text using WhatsApp. Participants also sent a screenshot a picture of their graph, any other app features, or photos in everyday life that they wanted to share. This baseline test was helpful in terms of a check to see

whether participants needed any technical assistance, and as a gentle entry into the diary entry process.

### **Ovulation**

Participants then manually logged into the Proov app when their ovulation occurred. Most of the participants used another at-home hormone detection wand, known as an ovulation predictor kit, to detect their ovulation. Once they logged ovulation, they sent a brief message to let me know so that I knew when I could expect the testing window to start (one week after ovulation). The Proov app requires this manual ovulation log to prompt the user to test for progesterone.

### **Progesterone Testing Window**

Proov prompted participants to start the progesterone testing a week after ovulation. This was carried out each day for four days in a row. Again, a diary entry with a screen shot of the hormone graph and any other photos were shared with each one of the progesterone tests. As a researcher, I responded with further question prompts as needed. I provided validation of their emotions through empathy and summarising their experience. I also responded to things I found interesting in line with a new materialism perspective, where as a researcher I was enacted in the lines of knowledge generation. For any content I found worried about in terms of heightened distress or ethical issues, I reached out to the clinical supervisor overseeing this project for direction.

## **Interview**

Each participant was interviewed after the diary data collection process had taken place. After the final progesterone test had been completed, I asked participants of a suitable time for a semi-structured interview. I aimed to avoid the time of a menstrual period to avoid perpetuating any feelings of being upset. Interviews were held online through Zoom, and were approximately 50 minutes in length. Interviews were semi-structured and photos shared through the diary text entries were reflected on. I had a set of questions (see [Appendix E](#)) to follow. I kept this structure, however, there were often important experiences I noted from the diary entries that I knew I wanted to explore in depth. After the interview, participants were followed up with an email check-in, where I reminded them of the support services available. Interviews were audio-recorded and transcribed verbatim for the analysis.

## **Data Analysis: Reflexive Thematic Analysis**

The data were analysed using reflexive thematic analysis developed by Braun and Clarke (2022). When Braun and Clarke (2022) argue that the researcher actively produces themes through their engagement with the data, the approach seems particularly fitting for the theoretical perspective taken in this research. Specifically, phenomena are thought to be in a constant state of entanglement from a feminist new materialist perspective, and whatever is made to matter by the researcher ultimately shapes the research outcome. From an ethico-onto-epistemology, a reflexive analytic process attends to the responsible intra-action that Barad (1998) talks about, where humans will always be entangled and never independent. To this end, the reflexive feature of reflexive thematic analysis makes it a natural fit for this research.

The flexibility afforded in reflexive thematic analysis is also why it is well suited to this research. In fact, it is often described as more a method than a methodology (Braun & Clarke, 2022). However, this does not mean reflexive thematic analysis is atheoretical. Assumptions about the nature of reality and knowledge will always be operating in the background, whether researchers acknowledge this or not (Chamberlain, 2014). Therefore, good reflexive thematic analysis is purposeful and explicitly structured by theory (Braun & Clarke, 2022). In a sense, theory gives the analytic method its unique flavour. Moreover, it provides the process with analytic power and validity (Terry et al., 2017). The flexibility afforded by reflexive thematic analysis makes it useful for employing new materialist concepts, such as agency and intra-action. Overall, I structured reflexive thematic analysis with the theoretical assumptions and concepts underpinning this research, and lay these steps out further in the data analysis process section.

### *The Reflexive Thematic Analytic Process*

Reflexive thematic analysis was carried out using phases drawn from Braun and Clarke (2022), and was structured with the concepts underpinning this study. While the following phases are set out in linear form, the process was at times cyclical, involving repeated engagement between each phase.

#### **Phase 1: Reflexivity and familiarising**

The familiarisation stage of reflexive thematic analysis is essentially about getting to know the data as data (Braun et al., 2018). To engage with the data in a relaxed yet thoughtful manner, I drew a visual overview of the participants' cycles and mapped out significant moments (Figure 4). I went back and adjusted the cycle drawing as I became more familiar with the data through engagement. In keeping with (Braun & Clarke, 2022)'s 15-point quality criteria (p. 378),

I rewatched the recording to check for transcription for ‘accuracy’. I texturized the transcript with pauses, laughter, and participant quirks that would add nuance and depth to subsequent coding. I highlighted interesting features and sections where I felt like there could be ‘something’, while also refraining from labelling what that ‘something’ is. Part of this exploration meant engaging in reflexivity. Accordingly, I noted parts that resonated with my own journey so that I could see if there was another way of reading the data. Overall, I aimed to familiarise myself with the data in a way that would open up the many different possibilities for coding, which would occur in subsequent stages.



Figure 4. Example Familiarisation Drawing of Lucia's Cycle

## Phase 2: Identifying Initial Descriptive codes

After the familiarisation stage, I moved into a more systematic and focused type of engagement with the data. In keeping with the feature of deep engagement, I opted to hand code each transcript. I assigned clear and succinct descriptive codes to “chunks” of data, which would

help organise the data around patterns of meaning to be developed in the next stages (Braun & Clarke, 2022, p. 137). Braun et al. (2018) describe two broad types of coding: inductive or deductive coding. Inductive coding is where the researcher works from the data in a ‘bottom-up’ fashion. While the researcher will always carry preconceived ideas based on their unique engagement with the world, an inductive orientation to coding aims to start with the data, rather than import existing theories (Terry et al., 2017). A deductive orientation to coding on the other hand, is where the researcher brings various concepts or theories as a lens to explore and tag the dataset with. At this stage, a more inductive orientation was taken to ensure subsequent themes and interpretation was grounded in the data. Accordingly, I aimed to stay close to what the participant was saying, checking to see if each code was in fact seen in the data.

Another consideration is the semantic or latent meaning identified (Braun et al., 2018). Semantic coding captures the explicit or surface level meaning, whereas latent coding locates a deeper or implicit level of meaning that explains the data. According to Braun and Clarke (2013, p. 121), latent and semantic coding exists on a continuum and in this analytic phase, I captured both semantic and conceptual elements. Braun et al. (2018) cautions researchers to not use this stage as a method of data reduction. For this reason, I made sure each code had a singular meaning, rather than multifaceted meanings (Braun & Clarke, 2022). I chose to create more codes where needed rather than relying on one description. Given that Reflexive thematic analysis is about identifying patterns of meaning through repeated engagement, codes tended to evolve as I moved through the dataset (Braun & Clarke, 2022). Accordingly, I reviewed and tweaked codes as I noticed similar or shared meanings through the dataset. Overall, I assigned succinct descriptive codes which captured the essence of data through a systematic process of engagement.

### **Phase 3: Developing Interpretative and Conceptual Codes.**

The theoretical perspective taken in this research called for an interpretive and conceptual phase in the analytic process. At its most basic level, interpretation is essentially “working out what is going on” (Braun & Clarke, 2022, p. 291). Interpretation is contingent on the researcher’s particular vantage point, and the contextual setting where it takes place. The fact that any number of meanings can be made is not a case of ‘anything goes’, rather, it makes the most sense to the researcher at that point in time. In this way, interpretations should be justifiable. Firstly, Braun and Clarke (2022) suggest the practice point of asking oneself whether there are good grounds for the claims being made about the data, rather than looking for the one ‘correct’ or ‘right’ answer (p. 295). Up until this point I had restrained from leaping into themes and leading with pre-formed ideas. This resistance was an important part of the analytic process, as the resulting themes are thought to be an outcome of repeated engagement as a process (Braun & Clarke, 2021). As a result, the more latent interpretations made in this phase were grounded in the foundational phases.

Secondly, the approach to coding should be suited to the purpose of the analysis and research objectives. Part of the justification is being able to explain to the reader why such an interpretation makes sense (Braun & Clarke, 2022). While the interpretation was grounded in the dataset, the meaning making came together through the conceptual and theoretical lens taken in this research. Taking a new materialist lens meant paying close attention to process in terms of the flows that takes place. I paid attention to how experiences and feelings were materialised through concepts underpinning this research, such as the human and non-human actors involved

an assemblage; the process of intra-action; the distributed and composite nature of agency; and the affective experience.

#### **Phase 4: Development of Subordinate Themes**

After developing conceptual codes, I used these smaller units of meaning to form themes. In contrast to codes, which are specific features of interest, themes describe the overarching patterns of meaning and capture the essence of large sections of data (Braun et al., 2018). Good themes tell a coherent and insightful account of the data that attends to the research question (Braun & Clarke, 2022). Therefore, I made sure the themes attended to the theoretical concepts underpinning this project. As I played around with different theme prototypes, or candidate themes, I started to think about the relationships between these themes in relation to the overarching story. In this way, the themes can be thought about as chapters in a storybook, each chapter tells the best possible of the data and together, they form an overarching narrative (Braun & Clarke, 2022).

#### **Phase 5: Development of Superordinate Themes**

In the development of themes, I started to identify the nature of the potential themes. At this point, I reflected on the quality of themes, whether they were grounded in the data, and where the boundaries of the theme lay. I checked whether there was enough meaningful data to support each theme. As a result of this reflexive questioning and checking, I ended up going back and forth to the original phases and revising my themes significantly. For example, I learnt my conceptual lens was brought in too early leading to an incoherent narrative. Instead, I brought the conceptual understanding after the descriptive codes had been developed from all the participants' data together. Part of this meant letting go of earlier ideas or 'murdering my

darlings'. Moreover, it also involved stepping back from being so engrossed with the data to ask myself quite simply: What is this all really about? I found such questioning helpful in the development of a final narrative, and I conducted a similar approach to naming the themes. Overall, this phase was very much about trying to find the best possible story for the data.

### **Ethical Considerations and Procedures**

A full ethics application with Massey University Human Ethics Ohu Matatika 1 was gained with the Massey ethics approval number OM1 25/08 (see [Appendix G](#)). Features of this application and study design are discussed in the following sections.

#### ***Beneficence and Nonmaleficence***

The inclusion and exclusion criteria were key to minimise the risk of distress for participants, and to ensure the study was beneficial to participants. To see these criteria, please refer to the methods section. Firstly, the time frame of actively trying to conceive for six to 12 months was decided upon, because after six months of trying unsuccessfully, people would likely be looking for further answers. Progesterone information would be helpful in the sense that it could provide participants with another piece to their fertility puzzle. Infertility is defined as actively trying to conceive for more than 12 months, and therefore people within this bracket were excluded to reduce the risk of greater harm or perpetuation of distress (Balen, 2023).

Secondly, in terms of the age range, women who are between the ages of 30 to 35 would be attending to their fertility as the average age for a first child in Aotearoa New Zealand is currently 32 years age (World Bank, 2021). For those over 35 years of age, there could be added pressure and anxiety based on the fact that fertility starts to quickly decline from 35 years of age

(Balen, 2023). For Māori and Pacific people, the age range was suitable based existing infertility research with Māori and Pacific people (Le Grice et al., 2023). While the average age for a first child is generally earlier for Māori women, Rarere (2018) suggests Māori tend to have children over a longer period of time. Secondary infertility, where a couple or individual experiences infertility after a first child, can often be overlooked (Shaw, 2022).

The hormone progesterone was chosen as the lowest risk, in terms of seeking treatment or support. Firstly, high progesterone would offer relief and reassurance for participants, as clinical studies show a 75% increase in pregnancy rates when PdG levels are high (Beckley et al., 2022; Wegrzynowicz et al., 2022). Whereas low progesterone for luteal phase support is relatively easy and straightforward to treat, involving suppositories which are currently government funded in Aotearoa (Balen, 2023; Pharmac, 2025).

Finally, a clinical psychologist supervised the process where any heightened distress could have taken place. The diary entries acted as a means to companion along with participants in their journey, where any distress of concerning content could be raised with the clinical supervisor straight away. The diary entries also provided participants with a confidential, non-judgmental space, where they could express their thoughts and feelings of trying to conceive, in what can normally be an isolating experience.

### ***Autonomy and Informed Consent***

To encourage voluntary and informed decision making, participants received an information sheet outlining the research purpose, process, risks, and benefits, and participants were encouraged to ask questions (see [Appendix C](#) for the Participant Information Sheet). An initial mihi or pre-interview meeting was provided to discuss the aspects of the study, including

the fact that participant comments can be withdrawn within two weeks post-interview. Proov was specifically contacted for details around their privacy and storage policies, including how participants can delete their data. Details of this were made transparent in the information sheet so that participants could make an informed decision on whether or not they wanted to participate (see [Appendix C](#)).

### ***Privacy and Confidentiality***

Screenshots of hormone graphs and any shared photos were used to facilitate the interview process, and were destroyed shortly after. Diary entries were sent securely (encrypted) through WhatsApp and the researcher had a study specific SIM card for this purpose. The interview was recorded on Zoom and transcribed by the researcher, with all identifiers removed and pseudonyms assigned. All data was stored securely on Massey OneDrive password protected server.

### ***Treaty Principles***

Every effort was made to uphold the Treaty of Waitangi principles of protection, participation, and partnership (New Zealand Legislation, 2018). Prior to cultural consultation, I researched existing literature on fertility in the context of Māori, Pasifika people, and Aotearoa. I have noted some of the key considerations taken for this research below.

I found that there are significant fertility challenges and barriers for Māori seeking fertility care in Aotearoa (Shaw, 2022; Shaw & Fehoko, 2023). For example, many Māori and Pacific people are ineligible for publicly funded fertility treatments based on their body mass index (BMI), despite the metric being established on European populations (Shaw & Fehoko,

2023a). Also, I found that Māori and Pākehā have very similar rates of infertility (Righarts et al., 2017). Therefore, the at-home technology examined in this study seemed promising for a more accessible means, yet what was involved remained unclear. To this end, this study was important for Māori communities as well as the broader population, as a clearer understanding of what is involved needed to be gained.

In terms of the recruitment and the Treaty principle of participation, I recruited through the same social media groups that prior research with Māori, Pasifika people and fertility had recruited successfully. For example, Le Grice et al. (2023) looked at Māori and Pacific experiences of infertility, access to information and pathways to care and found ample interest with one specific Facebook group (“Fertility Support NZ”), so I made sure I advertised here. I also used Le Grice et al. (2023), which had a mean age of 36 years, as reference to make sure the age range in my study was suitable for Māori.

In terms of transparency and the principle of partnership, information about the study including the use of data was made explicit in the information sheet. I also did an initial mihi or meeting to discuss the research project for those who were interested, which support people were invited to attend. Following this, there was ample time to talk to friends and whānau about participating.

In terms of the research design and principle of protection, it was important that Māori were able to connect as their authentic self. An option to connect via video chat diaries through WhatsApp and the ability to bring a support person to the interview was made clear for all participants. In addition, I provided all participants with urine collection specimen cups and a urine detection card (to place the wand on), to ensure clear separation of all taha tinana or bodily

functions from other functions (e.g., cleaning/benchtops or eating/cups) (Waitemata District Health Board, n.d). Overall, the research process was designed to make the study an enjoyable, positive, and safe experience for all participants including Māori.

### **Quality Criteria**

Qualitative research is sensitive to context. Therefore, it is difficult to prescribe blanket criteria that can be used to appraise research (Frost & Bailey-Rodriguez, 2019). According to Cena et al. (2024), “qualitative researchers should draw on the elements of quality that they deem most appropriate for their specific study with its aims” (p. 2). In other words, the researcher is responsible for the decisions made in relation to what is appropriate for their study. Hence, quality criteria in qualitative research are about instilling trust in the reader (Frost & Bailey-Rodriguez, 2019). Research becomes trustworthy when the research process and rationale for the decisions made are clearly laid out, and transparency and cohesion are demonstrated. To this end, the following section describes the features I used to hold myself accountable in this research.

### ***Transparency***

Transparency is about being open and honest about the research process (Cena et al., 2024). There needs to be enough information or clarity for the reader to evaluate the research (Frost & Bailey-Rodriguez, 2019). This does not mean an argument needs to be perfect, rather the rationale for the decisions made should be laid out (Cena et al., 2024). With this in mind, I have sought to be candid about the research process by providing reflexive moments in response to research stages or dilemmas. For example, the reflexive commentary on the recruitment of

participants. I also kept an ongoing reflexive journal throughout the research process to reflect on my assumptions and to aid in reflexive thinking.

### ***Coherence***

To achieve research coherence, I made sure every component of the research project has been designed in a way that it all hangs together in a cohesive way. I aimed to “think with theory”, rather than rely on check list of guides (Lupton, 2019, p. 2000). Lupton (2019) describes thinking with theory as ‘acknowledging and highlighting the importance of the theoretical perspectives on which they are drawing in shaping their research’ (p. 2000). Taking this into consideration, I defined concepts, such as assemblage, affect, agency, and intra-action that could be applied to the research meaningfully. I continually drew from these concepts throughout the research process. I also drew from Barad (1998)’s ethico-onto-epistemology by integrating a reflexive approach throughout the process, and thinking about the real-world implications of the study’s findings. Overall, all components of the study hang together and ultimately flow from the research question.

### ***Rigour, Commitment and Richness***

The researcher must strike a balance between achieving rigour in the research design, while staying true to the flexible nature of qualitative research (Frost & Bailey-Rodriguez, 2019). In essence, systematic process should not be at the expense of innovation. Yardley (2000) suggests rigour in qualitative research can be achieved through depth: including depth of engagement with the topic, and depth of data analysis. Firstly, I engaged thoroughly with the data over time and in stages, which is in keeping with the features of reflexive thematic analysis.

I aimed to become somewhat of an ‘expert’ on the data. Keeping the sample size smaller, meant I could establish such a level of depth with the time constraints of Master’s research project.

Secondly, my history of fertility difficulties has lent me a level of contextual understanding in content, which contributes to the rigour and richness of this thesis. According to Yardley, depth can be achieved through “prolonged engagement with the topic (not necessarily just as a researcher, but also in the capacity of a sufferer, carer etc.)” (p. 221). Holding insider status helped elicit candid and meaningful experiences that were built on strong research-participant relationships. Similarly, I became an expert in the technology in an effort to contribute to the rigour of the research design. For instance, I spent time trying the technology out myself and observing online Proov social media groups and forums.

### ***Impact and Contribution***

Qualitative research is not generalisable to the wider population in the way that quantitative research is due to the nature of smaller homogenous groups (Cena et al., 2024). However, qualitative research can still valuably contribute by being relevant to other contexts. In this research, I have thought carefully about the purpose of this contribution and who values from it in relation to Barad (1998)’s ethico-onto-epistemology as detailed in the previous sections. In essence, it was important that this research contributed meaningfully to those who go through fertility difficulties by looking at the perspectives and experiences of those who would be using the technology. At the same time, I wanted to show how feminist new materialism could be applied to the current human-technological arrangements for future research to draw on. In addition, the research outcome could inform ethical app development or call for better policy and regulation of at-home technology. At a broader level, this research could contribute to the

larger conversations around what the current technological revolution presents. For example, can we assume that AI tools, such as ChatGPT or automated note takers in clinics, are neutral or agentic? At the very least, I wanted participants to benefit. Therefore, I carefully chose a hormone that would offer them valuable information regardless of the reading. One which was quite easy and cheap to treat. Ultimately, each decision was carefully considered so that the research was designed in a way that would potentially add value on several levels.

### ***Reflexivity***

Reflexivity is key to quality control in this research. As the main instrument of inquiry, the researcher cannot be standardised from a qualitative perspective due to their unique thoughts, feelings, and experiences (Frost & Bailey-Rodriguez, 2019). Therefore, reflexivity involves having an awareness of what the researcher brings to the study so that it becomes clear how they are implicated in shaping the findings. To achieve this awareness, I have reflected on my assumptions and reactions to the research using my reflexive journal. I have also stated my positionality in the research to provide context for the research. Secondly, I have carried out continuous reflection on the interpretations made, which involves both my experience and the phenomena under study.

I also maintained epistemological reflexivity by carefully considering the choices made. Rather than forcing the research process to best meet the confines of one traditional classification, I have intentionally pulled out concepts and foundational assumptions that all work together to best respond to my research question. Finally, in terms of interpersonal reflexivity, I have actively sought to consider ‘the relationship surrounding the research process impact the context, the individuals involved and the findings’ (Frost & Bailey-Rodriguez, 2019,

p. 65). To achieve this, I have shared my history of fertility difficulties with participants in an intentional way. For example, I built rapport by stating my history on the information sheet in general terms, yet I refrained from sharing parts of history that would cause further worry, or ‘trump’ participants’ experiences leading to superficial data.

### **Reflexivity of the Methods**

Over 30 people expressed interest in the study and did not meet the criteria due to the fact they had been trying to conceive for over 12 months or more. Based on the online engagement I received, it is quite likely interest would have been significantly higher if the criteria had been wider (particularly, those over 12 months of trying to conceive). Interest included those from Wāhine Māori, Pacific people, and those from other ethnic or sexual minorities. For example, one person trying to conceive identified as a man with a uterus wanting to gain insight after going off testosterone, indicating the untapped potential hormone technology could have for those of diverse genders. Overall in reflection of this interest, it appears that this technology appeals more to those who have been trying to conceive for some time. Despite initial difficulties in recruiting those who had been trying to conceive under 12 months, the rationale for the criteria still stood: At the end of the day, I was providing people with something that would intervene with their lives. Furthermore, this hormone tracking technology had not yet been studied, making the psychological implications essentially unknown. Ultimately, five suitable and consenting participants were recruited and achieved the goals of this study while maintaining ethical rigour, particularly as I was a student researcher and people trying to conceive for more than 12 months may be considered particularly vulnerable.

It quickly became apparent how integral diary entries were to the research design, due to the cyclical nature of the menstrual cycle, and the ‘rollercoaster’ of emotions found throughout the cycle. Firstly, it was useful for the participants to recall on an experience tied to a particular test and day in the cycle. Photo elicitation of screenshots was also helpful in this respect. Diaries were also helpful for interview preparation. Specifically, diaries helped me identify any potential issues of distress, for example, one participant had an interview scheduled at the time her period was due. Through diary entries I knew where her headspace was at so together we rescheduled a more suitable date. Secondly, I accessed hot cognitive moments which would have been lost or changed over time. This is in keeping with a new materialist perspective, where experience and understanding is intrinsically tied to a particular moment. Essentially, the meaning making described in their progesterone testing diaries different to when they were reflecting in the interview and already knew the outcome of that cycle. In a new materialist sense, this meant diaries participated in how themes took shape because of the unique data collected at these points in time.

Finally, the screenshots were valuable for myself as a researcher, because they added depth to the sensemaking process in line with prior research (Andelsman, 2021; Light et al., 2018). Additional photos, however, were scarce which was not unexpected given that reproductive processes are internal and symptoms are difficult to capture (e.g., cramping). It could also be to do with the fact that many of these women had extremely busy lives, juggling full time work commitments, existing children, and domestic duties. Experiences or emotions, such as anxious thoughts, were often managed ‘on the go’ or worked into busy lives. That being said, when photos were used they elicited deep reflective thoughts particularly in relation to trying to conceive.

## Chapter Four: Data Analysis

In this chapter, I present the findings of my research project. Three themes captured the shared experiences of women in my study who used progesterone tracking technology while trying to conceive, which are outlined in the table below (Table 1). The overarching thread which weaves through these themes is that progesterone is a new actor within the trying to conceive assemblage. With this new entry, participants described new learnings, new understandings, and new affective experiences. The first theme describes how progesterone, as a new actor, enables a sense of empowerment through gaining new knowledge, but could also simultaneously create disempowerment through further responsabilising of them in relation to conception. This was a substantial theme on its own, and described through the title *New Flows of (Dis)Empowerment*.

The second theme *New Functions and Phases* describes how progesterone's entry into the trying to conceive assemblage produced new functions and phases in the reproductive body. The three distinct subthemes describe how: progesterone reconfigured the body as a well-functioning environment; brought the implantation process into a reality; and changed how participants experienced the time of waiting to know whether they were pregnant.

The final theme *Affective Materiality of Progesterone Datafication* describes how progesterone produces new affective experiences through the way it participates in the trying to conceive assemblage. The first subtheme *Little Spikes of Anxiety* describes how anxiety is materialized through the uncertainty surrounding progesterone, including how outcomes are drip fed over time. The second subtheme *Thresholds of Hope* describes how progesterone

materialized hope into something tangible and concrete by setting up new thresholds for participants to meet, which ultimately made pregnancy feel more or less likely.

**Table 1**

*Summary of Themes*

Theme	Sub-theme
1. New Flows of (Dis)Empowerment	
2. New Functions and Phases	2.1 The Receptive Environment 2.2 Materializing Implantation 2.3 Reconfiguring the Wait
3. Affective Materiality of Progesterone Datafication	3.1 Little Spikes of Anxiety 3.2 Thresholds of Hope

**Theme One: New Flows of (Dis)Empowerment**

This theme describes how new ways of learning about the body are created when progesterone enters the trying to conceive assemblage. Participants described experiences of empowerment with this new actor, because it opened up new possibilities for knowing the reproductive body. However, as a previously untracked hormone, the role and significance of progesterone in conception was unknown for participants. Moreover, the ambiguous representation of progesterone, as a foreign actor, nudged users towards self-improvement. Such engagement provoked self-reflection and awareness over normally concealed processes, causing participants to see if they ‘measured up’ to this new framework. The responsibility involved in

this pedagogy process was sometimes described as disempowering. That being said, new progesterone pedagogy relationships were formed, which ultimately offered deeper and more connected ways of knowing their reproductive bodies.

Participants saw progesterone as an exciting new actor in the trying to conceive assemblage. Progesterone was seen as a new source of information that could help participants solve their fertility issues, or explain why conception was not occurring. As Janine explained, “There's a little bit of like excitement, if that's the right word, a bit like, oh, I'm starting this new thing this could be another step and information” (Janine, 33 years old, interview). At the heart of this quote is an assumption that greater understanding of the body will lead to better capacities for action. New information thus becomes exciting to participants, as it is “another step” closer to figuring out their bodies. Below, Claudia describes how this meaning-making produced a sense of empowerment, especially in the context of trying to conceive which she frames as one being very much is outside of her control:

You're actually being a bit proactive in your journey as well, because there's so much outside of your control, which even now it's like aside from that [progesterone] test, it's still outside of your control. I think there's something to be said for, like you're contributing somehow to like, maybe yeah, just by learning more about your body (Claudia, 30 years, interview).

In this extract, progesterone testing is described by Claudia as a means to gain agency and recuperate some control (“aside from that [progesterone] test”). Underpinning this extract is an

assumption that reproductive outcomes can be managed, or altered, by rendering the body into knowable forms. In this sense, progesterone is understood as a means to gain control because it is seen as an opportunity to know the reproductive body better (“learning more about your body”). A sense of agency gained by progesterone within an uncontrollable context is what makes the experience particularly empowering (“there’s so much outside of your control”).

Claudia describes how the technology enables her to take an active role in her fertility by learning about her body. She takes matters into her own hands by educating herself (“you're contributing somehow to like, maybe yeah, just by learning more about your body”). This description ties into notions of self-responsibility, where fertility is seen as something that can be worked on and improved. Progesterone is seen as a new means to learn about the reproductive body, and as a result, Claudia gained a sense of empowerment (“you're actually being a bit proactive in your journey”).

Along with seeking to inject a sense of desired control within an otherwise uncontrollable situation in Claudia’s account, progesterone was also framed as a means to intervene in another previously uncontrollable situation, namely, health care system. In the extract below, for example, Kylie’s also talks about the ability to feel proactive, specifically in relation to her experience of an unsupportive medical system in Aotearoa New Zealand:

In a system where I don't feel like we are quite really supported in medically in terms of like figuring out what's wrong. You sort of just get told to wait, and yes, you wait and you wait. So I thought, this is really a nice way for me to just see if there's yeah. If there is anything going on that I can figure out (Kylie, 30 years old, interview).

In this extract, Kylie describes feeling unsupported in her attempt to understand why she has not been able to easily conceive. Within an unsupportive context, progesterone tracking appears as an empowering alternative to waiting, where she has the ability to proactively figure her own reproductive solutions (“to just see if there's yeah. If there is anything going on that I can figure out”). In a sense, Aotearoa’s unsupportive medical system is agentic, creating waiting times and sense of being out of control, that participates in the line of action where Kylie proactively seeks to “figure out” her own fertility difficulties. Time can also be seen as agentic because waiting is experienced as unsupportive, and it is something that can be resisted through this technology. Kylie had also explained how she had polycystic ovary syndrome (PCOS), which can cause irregular ovulation. She described PCOS as another layer of time pressure that could be worked against through this technology. Overall, progesterone tracking technology does not hold agency on its own. Rather, agency is dispersed through multiple actors, such as medical systems, time, reproductive syndromes, and progesterone, which all bring the line of Kylie’s proactive learning into action.

Kylie’s extract gives context for Deirdre’s description below of learning about the role of progesterone through everyday tracking. In particular, the at-home technology marks a shift in responsibility, where knowledge creation moves from medical professionals into the hands of everyday citizens. However, for Deirdre, this sense of sole responsibility was not experienced as a totally affirmative experience:

Every day I'd be like, Wait, am I sure? Was it? Was it definitely like, does it [progesterone drop] change at day 10? or does it change at day 11? like, I was definitely like reading a lot more going what? What should happen? What could happen? what might happen if I'm pregnant? What's normal? Because I've never looked at what happens for Progesterone (Deirdre, 35 years, interview).

In this extract, Deirdre described the mental labour involved in taking responsibility for learning about progesterone. Progesterone encouraged Deirdre as an expert in training, by keeping at the forefront of her mind (“everyday”). Taking on this role required a lot of mental effort because there was uncertainty over what was supposed to happen in relation to the new hormone progesterone (“I'd be like, Wait, am I sure? Was it? Was it definitely”). In terms of this, participants often described how their morning “thought time” that was usually reserved for domestic duties or family time, was instead spent towards learning about progesterone. Such attention can be related to an ideal reproductive citizen, where the user is encouraged to prioritize their fertility above all aspects of their life, and the energy and time sacrificed for conception is considered well worth the trade.

Through “everyday” monitoring, Deirdre was prompted to learn more about the role of progesterone in conceiving (“reading a lot more going What? What should happen?”). To find out about progesterone’s significance (“I've never looked at what happens for Progesterone”), participants would research through online forums, social media, and “doctor google” (Janine). The technology also required users to follow technical graphs, adopt biological jargon, such as DPP (days past peak fertility). They were encouraged to know intricate biological details, such as

how there is a surge of progesterone in response to ovulation. As a result, participants actively sought out online information to better understand these technical concepts. In this way, online forums entered the trying to conceive assemblage and participated in process of knowledge creation. Ultimately, through ongoing daily monitoring and online researching, users began to produce themselves into experts of the hormone progesterone and its role in reproductive processes.

Janine's experience of trying to understand progesterone's unknown role provides nuance to Deirdre's experience. Janine describes how the ambiguous representation of progesterone nudged her towards self-improvement. In the following extract she describes having no idea of what the numbers meant:

I have no idea what 6.2 really means haha. I have no frame of reference what anything really means and I know it isn't helpful to Google but it just feels like I have no idea what "good" looks like you know (Janine, 33 years, baseline diary entry).

Here Janine has no idea whether 6.2 is a "good" because she has "no frame of reference". This is partly because she is learning about the new hormone which she has not tracked before, but also, the technology did not provide her with any feedback for this number. As a result of this lack of context or feedback, she actively sought out what this number meant through "Google". The research involved in figuring these results out was another layer on top of an already laborious process. Specifically, participants often described the great amount of effort that this

technology required to produce numbers. For example, it requires the first morning urine and takes 10 minutes to develop for an analysis, which participants found lengthy when they had competing demands in the morning, such as parenting or exercising before work. In exchange of this effort, the technology gave lots of results, however Janine described how it was limited in the sense that it did not tell her whether she was normal or “good”. In other words, the technology gave results without any explanation.

Self-responsibility is relevant in this extract because she is wanting to find out what “good looks like”. Here, her account connects to the ideal moral citizen of reproduction, where the ideal user is expected to educate themselves on the strategies of self-improvement. When she details how internet searching is not “unhelpful”, she takes on the blame for both her lack of knowledge and seeking information outside of medical authority. A double bind has been created: On one hand she feels responsible for educating herself, and yet accessing uncredible sources that can lead to misinformation or catastrophizing is also feels irresponsible.

What is also interesting about this extract is how “6.2” is agentic. On one hand, numbers are understood as objective, concrete, and universal forms of communicating knowledge. Yet, in contrast, there is a sense of ambiguity in what this number represents. Together, the authority (number) and the ambiguous (“no idea”) create a certain line of action (“googling”). More specifically, the metrics demand attention, while the lack of clarity produces unease that prompts further action, which is fostered in a neoliberal setting (self-responsibility). Overall, this extract demonstrates how numbers cannot be treated as neutral nor discrete entities.

Other participants also described a lack of understanding of how to interpret the results, which was in relation to the number as with Janine above. However, this sense of ambiguity was

also found in relation to the visual hormone graph. For example, Lucia describes what it was like seeing her results on the graph when she had no idea of what they should look like. Lucia achieved a “positive” progesterone reading as dictated by the app, however placing this ‘positive’ into a graph produced a sense of disempowerment by creating feelings of inadequacy. She describes this experience in the following quote: “on the screen that looks really low, like it's still positive, but on the graph it's like it almost makes you think it's not enough” (Lucia, 32 years, interview).

In this way, the visual aspect of the graph is agentic. The visual representation (“looks really low”) of progesterone created awareness over previously concealed processes of her body which causes her to feel insufficient (“makes you think it’s not good enough”). Claudia also describes this visual display of the body and how it prompted self-questioning:

You sort of see the chart, and you're like, where should I be sitting in this chart like is, is that a good number, or is it? Should it maybe be like 7 at this point, and then be going up from there? Like, I guess, visually looking at it, you're like God, that still looks really low when you see it on the chart” (Claudia, 30 years, interview).

In this extract, Claudia is reflecting on whether she has a good result (“good number”). Placing the number into a graph caused her to consider whether she ‘measures up’ (“where should I be sitting in this chart”). In this way, the graph is a nudge towards self-optimization because the self-reflection evokes questioning (“is that a good number, or is it? Should it maybe

be like 7”). The white space becomes agentic (“visually looking at it”). In particular, the space acts as an invitation for self-improvement because it shows her all the areas where she could be sitting in the chart, but she is clearly not (“looks really low when you see it on the chart”).

A sense of uncertainty over progesterone as a foreign actor began to change over time as participants learnt about progesterone’s role. Once this initial learning took place, which could be described as an initial teething process, participants started to forge deep connections and bodily understanding. Deirdre explained how learning about “new fluctuations and the way [progesterone] peaks after ovulation and the way it’s sort of sustained if you get pregnant” was “cool” (Deirdre, 35 years, interview). When Deirdre describes this new learning as “cool”, she finds acquiring new knowledge about her body as interesting and satisfying. Kylie’s extract provides nuance for Deirdre’s description, where the everyday engagement with her body through monitoring provided her with a deep sense of bodily understanding:

It makes sense now. I've always found it like my hardest phase, emotionally like, I've always I'm definitely more emotional in that time, probably because of hormones going up and down like that. And I think it makes sense to me now that I do have good days. But I also have bad days, sometimes more bad days than good. But yeah, I guess that's why that's working like this. Yeah (Kylie, 30 years, interview).

Kylie explained how she originally understood the role of progesterone as a simple peak and fall process. Through daily progesterone tracking she learned about the fluctuations of

progesterone in the luteal phase (“because of hormones going up and down like that”). Importantly, this understanding was brought into being through her emotional experience of the luteal phase (“I’ve always found it like my hardest phase, emotionally”). In this extract, technology is not merely a mirror reflection of biology. Rather, the practice of measuring progesterone produces an understanding of the body’s daily fluctuations, reframing her “bad days” and “good days” into normal and natural parts of the cycle. Together through a relationship, they are made to be meaningful through their entanglement (this makes sense now; that’s why that’s working like this). Overall, this extract shows how new progesterone pedagogy arrangements are developed, with Kylie’s embodied experience playing an active role in knowledge generation. As a result of these deeper bodily connections, a sense of empowerment over the body is created.

In summary, participants described their relationships with progesterone as exciting. Progesterone became an agency of change within a neoliberal setting or limited medical support and a process where trying to conceive often felt uncontrollable. Yet this sense of agency came with considerable labour, and the shift in self-responsibility was sometimes a burden to bear. However, new deeper pathways for knowing the body were formed in exchange of this labour. Overall, experiences of empowerment were ambivalent and entangled with moments of disempowerment.

## **Theme Two: New Functions and Phases**

Theme two describes how new understandings about the body and the cycle were created through progesterone monitoring. Three of these new understandings are outlined in separate sub themes. The first subtheme, *The Receptive Environment*, describes how participants understand

the body as well-functioning receptive environment that is conducive to pregnancy. In the second theme, *Materializing Implantation*, the reproductive process of ‘implantation’ is formed through the practice of progesterone tracking. By making previously concealed biological process visible, the implantation of a fertilized egg into the uterus is brought into participants’ reality. In the third theme, *Reconfiguring the Wait*, participants describe new forms of activity, which leads to different lines of action and a reconfiguration of phases within the cycle. Specifically, the two week wait, which is the time between ovulation and finding out whether a pregnancy resulted, was normally experienced by participants as a long, drawn-out and passive wait. However, through progesterone tracking, this wait was transformed through a quick and active four-day window of progesterone testing. Overall, in this theme, progesterone as a new actor has participated in producing new phases and new understandings about the body that would not otherwise have existed.

### ***The Receptive Environment***

Progesterone participates in how the body is understood as a well-functioning and thriving environment that is conducive to pregnancy. In the following extract, Deirdre explains, after having seen a high score, “I feel like I knew my body was in a supportive environment. So I was like cool my body's doing the right thing. So there's every chance, you know” (Deirdre, 35 years, interview). Deirdre had maintained consistently high progesterone levels. By reaching progesterone thresholds, she saw this as confirmation that her body was “doing the right thing” and that her body was conducive towards a pregnancy (“my body was in a supportive environment”). In other words, it was functioning correctly and working towards the possibility of a pregnancy (“there’s every chance”).

In direct contrast, Lucia experienced a drop in progesterone during the final days of testing. As a result, she described this as “It's just not an environment in which things will thrive (laughing), we're on the way down, yeah” (Lucia, 32 years, interview). For Lucia, falling progesterone levels indicated that her uterine environment was unthriving or not conducive to pregnancy (“we're on the way down”). From this perspective, if any fertilized egg was present, it would not have been able to flourish and progress into a pregnancy (“not an environment in which things will thrive”). Cumulatively these extracts show how the presence of progesterone, whether this be high or low, participated in how the body was understood as either conducive to pregnancy or not. In this way, progesterone expanded participants' views of reproduction in the sense that a successful pregnancy not only depends on ovulation, but now also depends on a supportive environment.

In relation to this notion of a supportive environment, Claudia offers a nuanced perspective below. In particular, Claudia technically achieved the levels of ‘positive’ progesterone as dictated by the app, yet the levels were barely just hitting the mark. In other words, they were low scoring positives. As Claudia describes:

This is actually indicating what me, and my GP is thinking is happening for me because it does it does appear that I'm ovulating every month, but it's kind of almost that sensation of like it's limping along like it's trying to be. It's trying to do it. But there's just something in my body that's like, just not quite getting where it should be. (Claudia, 30 years, interview).

When Claudia first started this research project, she described being able to ovulate and conceive. However, she had two consecutive miscarriages and had wondered if progesterone could provide an explanation for this. In the extract above, progesterone delivered this explanation (“this is actually indicating what me, and my GP is thinking is happening for me”). Her next quote can be related to this description of low progesterone as reason for her miscarriages: “knowing what I know about having lower progesterone, this makes sense and in a way solidifies what my GP and I suspected” (Claudia, second progesterone diary). Seeing lower progesterone levels “solidified” what Claudia and her GP had suspected about having low progesterone. In this sense, progesterone is an actor which brings low progesterone, as a cause of her miscarriages, into an actual reality.

When she explains in the earlier extract “it does appear that I’m ovulating”, this is because she technically achieved the threshold of positive readings. To provide context, the technology (Proov) suggests that progesterone needs to reach a certain level to show that ovulation occurred. However, whether progesterone is high enough to support a successful healthy pregnancy is another question. For this reason, seeing lower progesterone levels gave Claudia the sensation that her reproductive processes were “limping along”. In other words, her body felt impaired or suboptimal. The visualization of progesterone sets up the conditions for imagining the body as something that can be self-optimized. When she details that her body is “trying to do it” she is describing how there is difficulty to thrive, there is “something in her body” that is preventing it from being a higher more thriving number (“where it should be”). In this way, her body is materialized as an active seeking thing.

For Kylie, a different progesterone pattern played out that participated in her understanding of her body. In particular, Kylie's levels fluctuated above the required levels for a positive, and ended the testing period with a strong level of progesterone. Kylie describes her understanding in relation to this pattern:

You know how you can be labelled as like hormonal [laughing]. But this time around, I'm like, actually, really, this is happening. But it *should* be happening, because this happened, so it's a good thing that I'm feeling like this because it means my body is doing what it should be doing (Kylie, 30 years, interview)

In this extract, a redefinition of what it means to be hormonal takes place. Rather than see being hormonal as a bad thing ("you can be labelled as like hormonal"), "hormonal" takes on a new understanding through progesterone fluctuations. The detail "this time around" shows the agency of progesterone specifically in creating this new understanding. In other words, its new presence changed her view of what it means to be hormonal. Through an assemblage of progesterone trend watching, online researching, and embodied sensations, Kylie learnt how hormonal fluctuations are part of a normal bodily processes. Importantly, her realization that fluctuations are normal ("it should be happening"), led to the understanding that her reproductive body was functioning well ("doing what it should be doing"). In this way, feeling hormonal is redefined as a good and functional aspect of reproduction ("it's a good thing that I'm feeling like this because it means my body is doing what it should be doing").

These new understandings were agentic, because participants took certain lines of actions as a result. In Kylie's case, the new understanding of her "hormonal" body reinforced her morning practice. As she describes, "[the results] made me really intentional about like drinking my supplements in the morning again, or like that Inositol [a supplement] again in the morning. Because I'm like this is helping me." (Kylie, 30 years, interview). To provide context, inositol is a supplement that is meant to help regulate menstrual cycles and ovulation, and is often used by women like Kylie who have polycystic ovary syndrome (PCOS) which can cause menstrual irregularity. Kylie started taking this supplement recently, and through progesterone testing, she came to understand that the supplement was in fact helping her body to regulate ("I'm like this is helping me"). In other words, it was helping her to create a well-functioning and receptive environment. As a result, she continued this line of action of taking inositol supplementation every morning ("it made me really intentional about like drinking my supplements in the morning").

Claudia's new "limping along" understanding of the body was also agentic. Except her new understanding causes her to think about changing her course of medical intervention. She describes this decision-making process in the following extract:

From that first positive pregnancy test, that's when you should take [progesterone medication]. So there's also that [progesterone test] information and you go, I wonder if there's any, if it would be beneficial for me to take it earlier? Just looking at what kind of happens with my body (Claudia, 30 years, Interview).

Claudia described how she had originally planned with her General Practitioner to take progesterone support medication after a positive pregnancy test as advised by medical specialists at the hospital (“from that first positive pregnancy test, that's when you should take it”). However through progesterone monitoring, she reached a new understanding of her “limping along” bodily processes or not “getting where it should” (“just looking at what kind of happens with my body”). As a result of this new understanding, she considers taking the progesterone medication earlier. Specifically, after ovulation when she observed low progesterone through the app, rather than waiting for a positive pregnancy test as originally planned (“there's also that [progesterone test] information and you go, I wonder if there's any, if it would be beneficial for me to take it earlier?”). In this way, Claudia’s extract speaks to the agentic power of these new understandings created by progesterone. Further, in this example, progesterone not only participated in shaping new understandings, but its involvement has led to intervention with medical advice.

In summary, progesterone participated in reconfiguring the body into a well-functioning environment, with progesterone levels suggesting that the body needed to perform appropriately in order to receive a pregnancy. Participants’ new understandings were agentic, because new lines of action were created that reinforced the body as needing to be a supportive environment. Ultimately, through the practice of progesterone tracking, participants understood conception as not only contingent on ovulation, but also on a receptive environment.

### *Materializing Implantation*

In this subtheme, I describe how measuring progesterone produced the idea of implantation occurring. Implantation is a seemingly immaterial biological process where a fertilized egg implants into the uterus. It has traditionally never been seen, as a blood test measuring progesterone would not be able to pinpoint an exact date, and an ultrasound cannot pick up the microscopic level at which it occurs. Therefore, when participants tested progesterone consecutively over a window of time through urine, it rendered the internal and intricate process into something visible and known. In the following extract, Deirdre describes how progesterone achieves a new understanding of an “implantation window”, by visually bringing the idea to the forefront of her mind:

The app it has the little like, you know the dial rainbow thing that says implantation window, and I guess I hadn't thought about that specifically before, at that time in the cycle like, this is my implantation window. So yeah, during those like testing days that's probably something else that about my body that I was like, oh, I wonder if something's implanting. This is the time, I guess. Yeah. So I guess, like it crossed my mind when it usually wouldn't (Deirdre, 35 years, interview).

In this extract, monitoring progesterone made Deirdre think about implantation occurring, when she normally would not have thought about it (“it crossed my mind when it usually wouldn't”). To provide context, the app predicts a rise in the hormone progesterone, which

occurs a week after ovulation. As a result of this rise, the app prompts the user to start progesterone testing and a visual is created in the app that tells the user that their implantation window is occurring. This visual has an arc which Deirdre describes as a “dial rainbow thing”. In this way, progesterone brings implantation to the forefront of Deirdre’s mind by making normally concealed processes visible (“on the app it has the little like, you know the dial rainbow thing that says implantation window”).

The specific time in the cycle also has agency because a progesterone rise is tied to a particular moment in the cycle (“this is the time”). “My implantation window” is co-constituted by a rise in the body’s progesterone, and the app’s expectation of this rise through a predicted testing period. Furthermore, a “window” is materialized because measuring occurs over four consecutive days (“during those testing days”). As a result, there is an anticipatory affect where she is acutely aware of internal processes occurring over this window (“I wonder if something’s implanting”). Overall, Deirdre’s extract describes an intra-active process, consisting of visuals, progesterone levels, expectations, and testing windows, which all bring the implantation window into a reality.

Janine’s experience can be related to this idea of a specific time in the cycle being intra-active. Except in Janine’s extract, she had an unusual result for the time in her cycle. She describes her thought process in relation to this in the following extract:

I suddenly thought, you know what, like when you hear all these stories and it's like, oh, I got my period throughout my pregnancy, we were up to week 6 with my

pregnancy or. Maybe I'm one of those people? It made me think, maybe, maybe it was like implantation bleeding (Janine, 33 years, interview).

Janine's response is in relation to an unusually high reading of progesterone for a baseline test. At the time, Janine had emailed the Proov team about her unusual result, who suggested high progesterone early on in the cycle could in fact indicate a very early pregnancy. As a result, Janine's understanding of her recent menstrual period momentarily changed ("I suddenly thought; maybe it was implantation bleeding"). At that moment, it was possible that light bleeding was a symptom of an embryo implanting into the uterus. Stories of people who had continued to have bleeding throughout their pregnancy participated in making this "implantation bleeding" a reality ("you hear all these stories"). When she considered "maybe I'm one of those people?" there is an element of hope, which is raised through all the stories who proved to be an exception. Overall, Janine's "implantation bleeding" was momentarily brought into reality through an assemblage of high progesterone levels, light bleeding symptoms, odd cycle timing, email advice, and stories of exceptional circumstances.

Lucia's experience connects in the sense that progesterone levels partly produced the idea of implantation. With reference to her hormone graph, Lucia explained how "If there's a drop in PdG then that's a sign of no implantation" (Lucia, 32 years, interview). In this explanation, "no implantation" is intrinsically tied to a "drop" in progesterone levels. Lucia had learnt about the significance of progesterone in the role of implantation through a process of tracking, learning, and researching online. Therefore, when she saw a drop in

progesterone levels through this graph she understood this as no implantation had taken place, and her cycle “was done” as she termed it.

Progesterone becomes agentic with Lucia’s new understanding, because it moved her focus from waiting for a pregnancy outcome to waiting for an implantation outcome. In particular, Lucia explained her decision to not pregnancy test at all this cycle because “I knew it was trending down, so I was just like, look, it’s definitely a no. Otherwise I just would have kept on taking pregnancy tests till I got my period” (Lucia, 32 years, interview). In this extract, she describes how certain she was of this new understanding (“definitely a no”), which changed her course of action (“Otherwise I just would have kept on taking pregnancy tests till I got my period”). Ultimately, progesterone produced implantation as a significant event or milestone for participants where it previously would not have been regarded.

For Claudia, implantation was materialized through progesterone results in conjunction with the symptoms she was feeling. To provide context, Claudia’s experience fluctuated quite a bit over the course of her cycle. Early progesterone results were reaching thresholds, but they were low, and only just meeting these thresholds. However, the last progesterone test showed a dramatic rise, where she thought a pregnancy had started. This particular progesterone pattern that played out, combined with the symptoms she was experiencing, materialized her experience of a “failed implantation”. She describes this understanding in the following quote: “I do feel like or like, I potentially feel like, maybe implantation failed or didn’t quite get there just because of the way my body was feeling. yeah, combined with that increased result combined with my symptoms” (Claudia, 30 years, interview). In this extract, Claudia’s unexpected high

progesterone reading (“with that increased result”), intra-acted with the felt symptoms within her body (“the way my body was feeling”), such as twinges and “implantation cramping” during the implantation window, and slight nausea after the testing window concluded (Claudia, first progesterone test diary). Essentially, a rise in progesterone numbers, together with embodied sensations (“that increased result combined with my symptoms”), and a negative pregnancy test outcome, all brought the idea of a failed implantation into a reality.

In summary, the concept of ‘implantation’ was materialized into a reality through the practice of measuring progesterone. Measuring made previously concealed and intricate biological processes visible and known. When participants visually witnessed progesterone through results, graphs and visuals, relevant and meaningful patterns from each participants’ unique engagement in the world brought the reproductive process of implantation into a reality.

### ***Reconfiguring the Wait***

Progesterone reconfigured the two-week wait through an active and intensive short period of testing. For those who are trying to conceive, ‘the two-week wait’ is commonly known as the time between ovulation and finding if they are pregnant (i.e., the second half of the cycle). It is often described as a slow and passive period where there is nothing to do but wait to see if a pregnancy has resulted. During progesterone testing windows, participants focused on achieving new progesterone benchmarks in an effort to gain clarity over the body. As a result of this activity and the attention it required, participants were distracted from the wait. The ability to *know* and *do* more through the new actor progesterone made the sensation of time feel faster, and ultimately reconfigured the two week wait.

Deirdre described how progesterone testing changed her experience of the two week wait: “It distracted me from the two week wait. With focusing on the testing etc. I was still thinking about a possible pregnancy, but I didn't have that other feeling of time passing slowly” (Deirdre, 35 years, fourth progesterone diary entry). In this quote, progesterone testing took her attention away from waiting to find out whether she was pregnant or not (“It distracted me from the two week wait. With focusing on the testing”). What is interesting about Deirdre’s description is that progesterone testing did not simply divert her attention from conceiving (“I was still thinking about a possible pregnancy”). Instead, progesterone kept conception at the forefront while adding a phase in the cycle. In other words, the goal of becoming pregnant remained, yet creating an extra task (“testing”) that requires energy and focus made the sensation of time feel faster (“I didn't have that other feeling of time passing slowly”).

Kylie’s perspective develops this understanding of another phase further. In the following extract, Kylie describes this new phase as an achievement, or milestone, that must be accomplished before a pregnancy outcome:

Interviewer: I’m curious, what was this [two week] wait like for you?

Kylie: It felt in a way shorter, because I was testing for something that could give me a positive before testing for something that could give me a positive like, there was like this in-between, like I can test for the PdG first. So I'm not actually thinking that much about the pregnancy like it sort of distracted me in a way like it kept my mind busy like, oh, this is the next step. So it felt lighter in the sense of it kept me busy (Kylie, 30 years, interview)

From Kylie's perspective, gaining a positive progesterone result is an added "step" in her trying to conceive process. Importantly, she understands this step as an achievement or something needing to be obtained first ("I can test for the PdG first"). In this way, a 'new positive' is a challenge to overcome in the immediate moment before a pregnancy outcome can be reached ("I was testing for something that could give me a positive before testing for something that could give me a positive"). As a result, the two-week wait is reconfigured into something incremental ("there was like this in-between").

Kylie also found that the energy and focus testing required kept her mind occupied during the two week wait ("kept my mind busy"). Participants described how the two-week wait was usually a difficult period that had to be mentally endured for each cycle. Time was typically spent ruminating over the different trajectories that could take place. Therefore, when progesterone entered the trying to conceive assemblage, progesterone testing became a new place participants could redirect this nervous energy, which explains why time "felt lighter" for Kylie. Instead of spending the wait anticipating the future, Kylie was able to experience time in the immediate moment because progesterone testing was the immediate task at hand ("this is the next step").

Lucia also describes how progesterone testing removed the feeling of a passive wait. However, the mental load she normally experienced in pregnancy testing was not removed, creating some ambivalence about the experience. In the following extract, she describes how it shifted towards progesterone testing instead:

It sort of felt like you were pregnancy testing earlier. So you didn't have that period of wait, which was nice, but instead you sort of had like a directly following ovulation a period of, like, intensity. Instead it brought forward, which is kind of nice but I feel like I knew earlier, which is good [pause] but, it sort of meant test test test think think think instead of having that time where you couldn't do anything (Lucia, 32 years, interview)

In this extract, Lucia describes the mental load of progesterone testing and relates it to a similar feeling of pregnancy testing, except it was earlier. Lucia's feeling of pregnancy testing is formed in relation to the highly sensitive pregnancy tests currently available. In a normal cycle, participants described how they usually started pregnancy testing six days before an expected period, due to the highly sensitive pregnancy tests that are available. Typically pregnancy testing was a continual everyday occurrence right up until a pregnancy or period was determined. Serial testing occurred this way, because a negative pregnancy test did not completely eliminate the possibility of a pregnancy. In other words, it was always possible that tomorrow's pregnancy test would be a positive. To this end, a "pregnancy testing feeling" is brought into being for Lucia through a similar serial wand testing phase ("test test test"), yet it was condensed into a short window of uncertainty ("intensity"; "think think think"), with an outcome by the end of this window ("I knew earlier"). As a result, the two-week wait is reconfigured ("Instead it brought forward").

Progesterone created a sense of certainty for Lucia of an unsuccessful pregnancy outcome ("I knew earlier"). The mentally intense four-day window was seen as the price

paid for this understanding (“instead you sort of had like a directly following ovulation a period of, like, intensity”). When she describes the elimination of the wait as “nice”, the exchange for certainty may not be entirely worth it. On one hand, gaining certainty or clarity over the body gives a sense of control that is craved by participants. However, there is also a sense of freedom in not being able to do anything (“having that time where you couldn’t do anything”). Ultimately, the ability to gain certainty through progesterone testing reconfigured the two-week wait from something passive into something active. Participants valued certainty, yet as in Lucia’s experience, the value of this is slightly ambivalent.

While the wait to pregnancy outcome was eliminated, or rather shortened, for Lucia, a new kind of post wait was created. More specifically, Lucia explained how there was nothing she could do after the progesterone testing window had finished but wait until the next cycle in order to start again. In this way, the wait to pregnancy outcome reconfigures into a wait to the next cycle, which is described as even more passive. For instance, Deirdre did not experience a drop in progesterone but described how this understanding would have felt: “knowing you weren’t pregnant already that would have dragged everything, that would have felt long. I would have been like, oh, now the two week waits like a million times longer” (Deirdre, 35 years, interview). It is this inability to actively find out anything further, which reconfigures the wait into “a million times longer” (Deirdre, 35 years, interview). In other words, there is nothing else to know or to do. As seen in the first theme, progesterone was initially framed as an agent for gaining control in a mostly uncontrollable experience of trying to conceive. When there is no ability to know

more or do more, there is a loss in agency, and this agency is what reconfigures the sensation of time slow and “long”.

In summary, the practice of progesterone tracking reconfigured the two-week wait. Progesterone, as a new actor, became something new that participants could direct their energy towards. Progesterone’s new entry created a new task to overcome, and a new opportunity to gain clarity over their body. As a result, a new ‘in-between’ was formed, involving a quick condensed window of activity, which ultimately changed the sensation of time. Importantly, it was the opportunity to know more and to do more which participated in materializing this experience of time.

### **Theme Three: Affective Materiality of Progesterone Datafication**

This theme describes the new affective experiences created with progesterone’s entry into the trying to conceive assemblage. Emotionally charged experiences were materialized through new progesterone benchmarks and thresholds. In the first subtheme, *Little Spikes of Anxiety*, anxious experiences are created through the way progesterone participates, for example drip feeding outcomes over a number of days, or creating a sense of uncertainty that requires navigating mentally complex online territories. In the second subtheme, *Thresholds of Hope*, participants are positioned as either succeeding or failing based on the lines that the technology draws. Hope is materialized into something tangible through new progesterone thresholds, where reaching these benchmarks makes pregnancy feel more or less likely.

### *Little Spikes of Anxiety*

Participants described it as “emotionally taxing” to take on the role of figuring out their bodies (Janine). With so much weighing on the line, participants worked anxiously to figure out what the progesterone numbers and new normals represented. During testing windows, participants had to endure continuous uncertainty as progesterone outcomes were drip-fed over a period of time. Taking sole responsibility for fertility required a lot of mental distress and discomfort, and as a result, participants had to navigate online spaces that were not clear, and contributed to their sense of unease.

In the following quote, Lucia describes the anxiety she felt during the progesterone testing window, “I feel like doing the tests does give you little spikes of anxiety and stress as to what it means” (Lucia, 32 years, interview). In this quote, the everyday testing was anxiety provoking. In particular, the technology drip feeds the progesterone testing process over a four-day window as opposed to other urine wand tests, which produce results in a singular moment. As a result of this daily testing, “spikes” of anxiety are felt episodically as opposed to a one-time occurrence.

Lucia’s description also points to the interpretive labour that is involved in unclear results. More specifically, figuring out what the numbers represented led to overthinking, which produced anxiety and stress (“stress as to what it means”). Uncertainty was produced for participants through a number of ways. Firstly, progesterone was a new foreign actor in the assemblage. With a lot riding on the line, participants become heavily invested in figuring out what progesterone represented. For instance, Kylie described in her diary entry “Emotionally, I noticed how quickly I went into overthinking mode, these little numbers carry a lot of weight”

(Kylie, 30 years, third progesterone diary). Participants knew that progesterone was significant because of the way the hormone was privileged through the technology, yet there was a learning curve to go on during this testing window in order to understand what exactly this significance was. Ultimately, participants found that the “overthinking” that was required for this learning curve was stressful (Kylie).

Secondly, the ambiguity of results in conjunction with self-responsibility left participants to research for themselves what was normal or expected. As Janine described, “I was constantly on Google, like Googling everything. Doctor Google. It just gave me anxiety not knowing what it should be” (Janine, 33 years, interview). Janine’s extract speaks to the shift from medical expertise to individual responsibility, which can be burdening not just in labour as outlined earlier but in mental distress (“anxiety”). Janine carried out interpretive labour when trying to figure out what the numbers and results meant (“constantly on Google”). Importantly, Janine’s anxious experience is driven by neoliberal notions of self-responsibility (“anxiety not knowing what it should be”). Here, she attempts to figure out what constitutes a “good” result in order to ascertain whether she fits the ideal. Janine explained how other menstrual apps provided instant statistics when she input data, and she found it reassuring to see where her results were in comparison to other users. Essentially she used statistics as an indication of whether she was normal or “good”. However in this new progesterone tracking arrangement, “doctor google” took on the role of providing comparisons and further context for her numbers.

What is interesting about Janine’s experience is that she praised the hormone tracking technology for its “no chance of failure around interpretation” (Janine, interview). She described her difficulty previously reading pregnancy test lines and praised the technology for turning

progesterone test lines into numbers. She described a phenomenon called “line eyes” where in the past she could not tell if she was seeing true faint lines on pregnancy tests, or whether she was simply seeing what she desperately wanted to see. For this reason, she praised the new technology for taking away this responsibility of reading and interpreting lines by producing exact figures. However, while these numbers appeared to be concrete and exact, they still required interpretation in order to gain meaning. For Janine, this process of figuring out created overthinking and “anxiety” because it shifted the responsibility of reading and interpreting back to her.

Claudia’s description of trying to make sense of her progesterone results through online research adds nuance to Janine’s interpretive process:

Interviewer: What were you wanting to find online? Reassurance?

Claudia: I think you find what you want to find. So you know, you can see negative things. You can see positive things. The more you look at one certain thing, the more you see it, you know, it's a very powerful tool, I think, with, like, mentally speaking, you have to be quite. [pause] It's yeah. It's a very emotional thing. (Claudia, 30 years, interview)

In this extract, Claudia discusses her experience of searching online for other people’s experiences of progesterone, particularly in the context of social media. She sees the online world as a mentally complex space (“it’s a very powerful tool”; “mentally speaking”). When

Claudia describes how “you find what you want to find”, a parallel can be made from Janines’ description of “line eyes”, where you see what you want to see. In a sense, ‘line eyes’ is reconfigured into ‘online eyes’. Ultimately, Claudia’s extract speaks to how the online landscape is not neutral. In particular, online information is not mere facts waiting to be retrieved, rather there is a complex interplay between the user, algorithms, and information that drives further engagement. Put another way, search engines produce information that is presented and designed in a way to hold the user’s attention, as opposed to information that is credible or helpful (“The more you look at one certain thing, the more you see it”). Therefore, Claudia understands online territory is difficult space “mentally” and emotionally because of the risk of preoccupation (“you have to be quite. [pause] It's yeah. It's a very emotional thing”). She further expands on this risk in the following extract:

I think it's hard not to compare in those scenarios, so I feel I have to be quite strict with myself, and also stop myself getting into these deep, like wormholes of just, you know, like tracking every single thing and checking every single thing (Claudia, 30 years, interview).

In this extract, Claudia describes the risk of excessive online engagement and self-monitoring that occurs (“deep, like wormholes”). On one hand, information was sought online to gain certainty and reassurance that her experience is normal (“compare”). However, a standardized experience did not really exist as everyone’s experience is unique, thus creating more uncertainty. As a result, vicious cycles of hypervigilance and

anxiety take place in the form of self-monitoring and comparing symptoms (“tracking every single thing and checking every single thing”). Despite such focus from participants, uncertainty persisted along with algorithms that fueled further engagement.

The power in the risk of this preoccupation can be seen in the way Claudia has to rein herself in (“I have to be quite strict with myself”; “stop myself”). On one hand she holds herself accountable for restraining her own preoccupation. Yet, she is simultaneously tasked with interpreting her progesterone results and seeking out what it means. Such double self-responsibility becomes a difficult line to walk. For this reason, participants all felt the technology had a potential risk for preoccupation or distress, particularly those who were “vulnerable” due to a lot of failure or loss (Claudia). Some participants suggested that the technology should have trigger warnings, particularly for those who would become distressed through everyday drip-fed information. Overall, participants described the one-off occurrence of progesterone monitoring as worth it for the information they gained, but they all generally concluded that the emotionally charged meaning-making process made it “unhealthy” for long term use (Lucia).

In summary, anxious experiences were materialized through the way progesterone participated in the trying to conceive process. Outcomes that were drip-fed over a period of time created anxiety that was experienced episodically. While the technology took away the mental unease in reading lines, a new kind of mental load was simultaneously produced. In particular, the ambiguity or lack of context around progesterone numbers created overthinking, and led to new sense-making which involved mentally complex algorithmic spaces.

### *Thresholds of Hope*

With progesterone as a new actor, new thresholds and benchmarks were created. As Kylie described this, “there's a little line that it needs to cross for it to be optimal” (interview). The technology dictated what thresholds participants need to reach. Such thresholds have agentic power because they determined whether participants could have hope or not. Participants who achieved these thresholds experienced a sense of success and had higher hopes of a successful pregnancy outcome. Conversely, when participants failed to meet thresholds, any sense of hope collapsed.

In the following quote, Kylie describes how she felt after her testing window had concluded: “My body is showing that it was successful. These are the numbers. This is why it was successful. I could hold on to that. There's that bit of hope” (Kylie, 30 years, interview). Here, Kylie achieved a progesterone score that indicated she had successfully ovulated (“it was successful”). Underpinning this quote is an assumption that technology produces a mirror reflection of what is occurring internally (“my body is showing”). In this sense, Kylie saw these numbers as concrete evidence that ovulation had occurred, and that her body was functioning properly (“This is why it was successful”). A blurring between the scores of her graph and her body is occurring.

Kylie explained how her results “ticked the right boxes” and “those numbers fell within what it was meant to do. Like really concrete like that. Not just maybe, or possible ovulation. And then this is why” (Kylie, 30 years, interview). By drawing specific benchmarks and cut off points through metrics (“right boxes”), the sensation of her body performing appropriately was created (“what it was meant to do”). As a result, Kylie experienced a sense of “concrete” or

tangible success (“this is why”; “not maybe, or possible”). This visual evidence provided hope, as the accomplishment was something she held onto while waiting for a final outcome (“I could hold on to that”; “that bit of hope”). Overall, an assemblage of thresholds or “right boxes”, progesterone datafication, and an assumption that hormones reflect biological processes, all materialized the experience of hope where it may not have previously existed.

For participants who achieved certain thresholds, a pregnancy became a very real possibility. In the following extract, Deirdre reflects on how she felt after achieving a third positive progesterone score in a row:

I think getting that 3rd positive was definitely when I felt that shift of going oh, yeah, this could actually be like a possible pregnancy. And not for any like scientific reason, because I know that it doesn't mean anything. But I think it was just that comfort in knowing yep it's positive, everything's on track” (Deirdre, 35 years, interview)

Here, Deirdre started to believe that a pregnancy was very likely after scoring three optimal progesterone results in a row. Three positive progesterone scores are needed by the technology in order to confirm a successful ovulation. To provide context, there are four progesterone tests, and at least three positive results are needed to confirm ovulation. More simply, there are four *chances* to confirm successful ovulation. As a result of this scoring system, the third progesterone test appeared to be a significant milestone for participants.

For Deirdre, this milestone produced a noticeable shift where a successful outcome felt more real (“this could actually be like a possible pregnancy”). When she describes how this shift is “not for any scientific reason”, this is because the shift appeared to have no rational basis. For instance, progesterone cannot directly mean pregnancy because it is not the pregnancy hormone (“I know that it doesn't mean anything”). Instead, the shift is an affective change as a result of the affirmative appraisal received. Overall, specific progesterone thresholds, such as at least three optimal results in a row, set up the conditions for success. When these milestones are achieved by participants, a greater sense of confidence is produced because it makes the success more tangible.

Essentially Deirdre’s sense of confidence was bolstered through the progesterone technology, as it told her she can have hope by meeting certain thresholds (“comfort in knowing yep it's positive, everything's on track”). Kylie provides nuance to this understanding when she became quite emotional talking about the power of these metrics: “[crying] those numbers also, like either tell you yes or no, like. Whether you can have that hope or not.” According to Kylie, the numbers are the gatekeepers to hope and possibility, and therefore hold agency (“tell you yes or no”). Numbers are seen as a true indication or visual proof of what is happening with the body and as a result, a sense of agency was lost for Kylie (“Whether you can have that hope or not”).

Lucia’s experience sits in direct contrast to Deirdre’s confidence because she describes an experience of losing hope. Her experience is relatable in the sense that the progesterone results shaped her sense of hope. In the following extract, she talks about losing hope after her negative result:

I think that was the point I gave up hope because I knew like, I think in my head I thought look if it's still 7, like if it's still stable, then yeah, there's sort of still a glimmer, but seeing that, I think it went down to like 3 point five for that one. Had it been stable there would have been hope but seeing it essentially halve, I was like nah we are done, like I know that means that the body has sort of like given up on this cycle.” (Lucia, 32 years, interview)

In this extract, Lucia describes her experience of seeing her progesterone drop below the threshold. Up until this point she had maintained a score that it was still possible to “come back from” (Lucia). The number “7” is the specific line drawn by the technology that decides whether she is failing or succeeding. She managed to meet this threshold in the early testing days, however on this third test day she experienced a dramatic drop below this threshold that felt irreversible (“seeing it essentially halve, I was like nah we are done”). Ultimately, this extract illustrates how Lucia’s sense of hope is intrinsically tied to numbers and thresholds, and the way the technology works. For instance, she describes how she would have had some hope if she at least met the specific line drawn by the technology (“I thought look if it's still 7, like if it's still stable, then yeah, there's sort of still a glimmer”).

What is interesting about Lucia’s extract is that there is a separation of the self and the body in her description. Her sense of agency is contingent on her body’s agency (“the body has sort of like given up”), which undermines her sense of control and empowerment.

Again, here is an assumption that the technology is producing a mirror reflection of what is occurring inside her (“I know that means the body has sort of like given up on this cycle”). To this end, visually seeing her body give up on her cycle (“seeing it essentially halve”), leads to her giving up on her cycle because she becomes powerless over the process (“that was the point I gave up hope”).

To demonstrate the agency of such “concrete” hope (Kylie), participants who achieved optimal progesterone achievements went out to pregnancy test the very next day. Specifically, Deirdre, Kylie, and Claudia experienced positive progesterone scores which made a pregnancy feel more likely. Deirdre described her sense of confidence when taking an early pregnancy test: “I was expecting and hoping it to be positive” (Deirdre, interview). Her expectations of a pregnancy had been raised because she had received confirmation from the progesterone tracking that her body was performing optimally. Likewise, Claudia described how she was “really gearing” up to see a “faint line on one of these pregnancy tests” as a result of a strong progesterone score on the last day of her progesterone testing window (interview). Kylie described a similar sense of confidence in response to her progesterone scores, “I think that's where I've mentioned like, why, like doing the pregnancy test, and all of that as well like, it gave me a lot of hope that this could be the round where it actually worked” (Kylie, 30 years, interview). In this quote, achieving progesterone scores solidified her sense of progress, where she expected a positive pregnancy outcome as a result of her achievements (“this could be the round where it actually worked”).

To further demonstrate the agency of progesterone thresholds in further shaping behaviour, participants who achieved these thresholds all pregnancy tested much earlier than they would usually. Specifically, the very next day after the progesterone testing window had concluded, whereas normally they all pregnancy tested much later in the cycle. Deirdre felt eager to get to the pregnancy testing bit and described how she was “rolling in a state of overconfidence” after achieving all the progesterone benchmarks with flying colours. In the following quote, Deirdre describes her decision to pregnancy test early and how it was different to other cycles: “I wouldn't usually test [early] like, maybe usually I'd test 2 days before my period, or something, you know, when it's like a bit more confidence in the results” (interview). In this quote, Deirdre gained a greater sense of confidence from achieving progesterone scores in comparison to other months (“when it's like a bit more confidence in the results”). As a result of this confidence, she pregnancy tested early because a pregnancy test felt more likely (“I wouldn't usually test [early]”), thereby illustrating how thresholds of hope were agentic.

In summary of this theme, new affective experiences were created through the datafication of progesterone. When outcomes were drip-fed over time, anxious experiences were materialized into something that was felt episodically. The ambiguity or lack of context around the datafication of progesterone burdened participants with the mental load of new sensemaking, which involved navigating mentally complex algorithmic spaces. New progesterone thresholds positioned participants as either failing or succeeding, leading to emotionally charged experiences. Achieving new thresholds materialized hope as something tangible and concrete, making future pregnancy outcomes also became more tangible and real. Overall, a blurring of

boundaries between body and technology occurred, where progesterone thresholds became intrinsically tied to materializing participants' affective experiences.

In conclusion, my analysis found that progesterone, as a new actor in the trying to conceive assemblage, was significantly involved in producing new ways of knowing, feeling, and the body. Through a lively and dynamic process, progesterone intra-acted with various human and nonhuman entities over the course of the cycle, and brought particular items and experiences into a reality. The themes *New Flows of (Dis)Empowerment*, *New Phases and Functions*, and *Affective Materiality of Progesterone Datafication* describe these new realities and how they came to be materialized through the new progesterone tracking technology.

## Chapter Five: Discussion

As detailed in my literature review, there is no psychological research on the experiences of at-home hormone tracking technology. Given that this technology is already in use, and the area of reproductive technology is forecasted to rapidly grow, addressing this gap is critical. To respond to this gap, this thesis uses feminist new materialist theory to conceptualise progesterone tracking technology as a discursive-material assemblage, where meaning, bodies and technologies are co-created. This thesis addressed the overarching research question:

How can feminist new materialist approaches be used to better understand the experiences of using progesterone tracking technologies when trying to conceive?

Followed by the sub questions:

1. How is agency enacted through new progesterone tracking assemblages?
2. How does progesterone tracking participate in the ways reproductive bodies are known and experienced?
3. How does affect circulate? What are the feelings and emotions produced through progesterone tracking technology while trying to conceive?

In this chapter I answer these research questions and discuss how my findings develop existing literature. I then discuss the implications, strengths, and limitations of this research. I finish by discussing the potential directions future research could take, and provide my final reflexive thoughts on the matter.

## **Understanding Experiences of Using Progesterone Tracking Technologies While Trying to Conceive**

In seeking to better understand the experiences of using progesterone tracking technologies when trying to conceive, the themes found highlight key issues of agency, affect, and the production of new ways to understand and experience reproductive bodies.

### ***How Agency is Enacted through New Progesterone Tracking Assemblages***

Findings demonstrated the distributed and composite nature of agency. Progesterone tracking technology did not create experiences on its own. Rather, progesterone became an agent of change through its ongoing sociomaterial achievement relative to multiple actors. For instance, unsupportive medical systems, time, reproductive syndromes, all brought the line of proactive empowerment into being. Likewise, the addition of a new hormone did not simply equate to greater fertility awareness or literacy. Instead, progesterone technology fostered the user as an expert-in-training through an assemblage of technical jargon, ambiguous metrics, results without points of reference, neoliberal self-responsibility, and readily accessible online lay knowledge communities. Ultimately, agency was enacted with multiple non-human and human actors in the progesterone tracking assemblage, which collectively brought certain experiences and lines of action into being.

Within this assemblage, certain experiences were materialized through an intra-active process, where progesterone encountered other items or elements in a lively way. Progesterone tracking technology set up the conditions of possibility, and through the practice of tracking, relevant and meaningful patterns emerged from participants' unique engagement in the world.

The body could be materialized into something well-functioning or “limping along”, because a lively and dynamic encounter occurred, involving graph fluctuations, low progesterone suspicions, or “good days” and “bad days”. In this way, items or objects, such as receptive bodies, did not precede their engagement, rather they materialized through their relational encounters over time.

### ***How Progesterone Tracking Participates in the Ways Reproductive Bodies are Known and Experienced***

The practice of tracking progesterone was a mutually co-constitutive process between various actors, forming the boundaries and parameters of the participants’ bodies being measured. The implantation window was not neutrally disclosed by the progesterone tracking technology as if it were a fixed inherent part of the body, as it involved an assemblage of actors to make this a reality. The actual practice of measuring progesterone produced the “implantation window” as a lived reality, where the thought of “something implanting” occurred to participants when it normally would not have. Likewise, participants did not move through the cycle as though each day unfolded as an equal unit of time. Tracking produced something new to know and do, and this activity changed the sensation of time.

Reproductive knowledge, such as the body needing a lush receptive uterine lining, was not waiting to be discovered. It was brought into being through the technology that privileged progesterone, miscarriages and doctor visits that raised suspicions of low progesterone, reproductive disorders that cause irregular ovulation, amongst many other actors which uniquely participated in how the body needed to be well-functioning. In turn, these new understandings or realities had real material effects on participants’ lives, such as taking supplementation to further

support these receptive environments. In this sense, receptive bodies were constantly being enacted.

Items, such as implantation, were materialized into what they were, or how they were experienced by participants, when progesterone intra-acted with various nonhuman and human elements. For instance, tracking over time produced a “window”, and embodied symptoms in combination with an unexpected progesterone peak and a negative pregnancy test produced “failed implantation”. Ultimately, progesterone tracking participated in how the body was known and experienced through a complex and lively encounter, where several components came together to materialize certain items or understandings into being.

### ***How Affect Circulates and The Feelings and Emotions Materialized in Progesterone Tracking Assemblages***

Affective experiences, such as anxiety or hope, were locally situated rather than stable or universal. Progesterone tracking technology did not produce feelings and emotions in a causal way. Anxious experiences were created through a unique assemblage involving progesterone as a foreign actor, technology that privileged progesterone, outcomes requiring four consecutive tests, partial results without context, neoliberal self-responsibility, and complex online algorithmic spaces. In a similar way, the technology set up the conditions for hope by drawing lines of what constitutes success. Through the practice of tracking, hope was materialized through metrics, met thresholds, visual displays served as proof that the body was performing optimally and therefore worthy of a pregnancy. Overall, experiences of anxiety and hope were materialized through the relational process of tracking, where a shifting assemblage of actors

intra-acted to form these affects. As a result, anxiety or hope were not fixed states but ongoing and contingent achievements.

Affective experiences were materialized on a continuum between participants and their environment. A blurring of boundaries between bodies and technology occurred, as external items, such as concrete metrics, produced real affective shifts. The visual displays and ‘truth-telling’ nature of metrics activated an underlying assumption that technology was a mirror reflection of the body’s interior state. Being able to visibly “tick” the “right boxes” created a sense that the body was “on track” for pregnancy, materializing hope into something that felt tangible and concrete. Therefore, affective experiences were always contingent on, and co-constituted by progesterone tracking. As a result, anxiety was something felt episodically, while hope was experienced as something tangible and real. Ultimately, feelings of anxiety and hope were not reducible to internal or discrete states, rather they became an ongoing force that became essentially inseparable from the progesterone tracking technology itself.

Drawing this review of the analysis together to answer the overarching research question, ‘how feminist new materialist approaches can be used to better understand the experiences of using progesterone tracking technologies when trying to conceive’, this study found that experiences with the technology were relational. Matter and meaning materialized through a lively and dynamic process of progesterone tracking. Agency was distributed among multiple nonhuman and human actors, which brought certain experiences and lines of action into being through the process of intra-action.

The practice of tracking progesterone reconfigured the body as receptive where something could implant, and the cycle as fast and active. These understandings were not

prefixed and waiting to be discovered. Instead, the practice of progesterone tracking, where multiple actors encountered one another, produced these as lived realities through an intra-active process of knowledge generation. Affect circulated through an assemblage of both human and nonhuman actors, on a continuum of participants and their environment. In this way, feelings and experiences were not contained internally but were co-created through the relations between bodies, technologies, and progesterone. Overall, exploring how agency was enacted and how bodies were known, felt, and experienced, generated a rich analysis that deepened our understanding of users' experiences of progesterone technology at a nuanced level.

### **Developing the Existing literature**

Findings from this research make a substantial contribution to the literature on hormone tracking technology by being the first to explore the feelings and experiences produced through its use. Existing research on hormone tracking technology has lacked depth and engagement with complex and multilayered understandings from users. For instance, Stujenske et al. (2023) conducted a large-scale study that pooled together different forms of hormone tracking technology and reproductive issues, resulting in findings that were unclear or inconsistent.

In contrast, this thesis explored one particular form of technology (Proov), one hormone (progesterone), the specific context of trying to conceive, using an in-depth research design. In doing so, I illustrated how progesterone, as a new actor in the trying to conceive assemblage, was significantly involved in new understandings and new experiences. Importantly, these experiences were complex and multilayered, and the research design had the capacity to attend to this complexity. For instance, a feminist new materialist approach showed how empowerment was experienced ambivalently, because it was contingent on the various human and non-human

actors that continually encountered one another to materialize this experience. In this way, the study delivered a nuanced analysis where experiences with technology could simultaneously be empowering and disempowering.

While Hills et al. (2023) offered a glimpse into how the technology can pinpoint and predict exact phases within the cycle, this research develops such findings by showing how such phases can produce new lived realities. The implantation window predicted by Proov through progesterone already builds on Hills et al. (2023) in the sense that an additional phase was created. In other words, Hills et al. (2023) details the menstrual, follicular, ovulatory, and luteal phases in the menstrual cycle, whereas this thesis described the implantation phase. However, my study demonstrated that this new phase actively shaped how participants thought of their bodies as receptive environments, prompting them to wonder whether something was implanting. Moreover, the actual practice of materializing this phase through everyday activity produced experiences of episodic anxiety, made a pregnancy feel more achievable, and fundamentally changed how participants experienced time. In this sense, when Hills et al. (2023) suggests phases within the cycle can change over time as an individual ages, my research shows how time is not experienced as an equal unit of measurement. Hills et al. (2023) draws attention to the biological clock discourse, while my study argues how the time experienced by users within each cycle matters. Both understandings are important, and collectively they offer greater picture of what is involved with the recent forms of technology.

In summary, in seeking to better understand the experiences of using progesterone tracking technologies when trying to conceive, I have substantially developed hormone tracking literature. I have shown that these technological experiences are complex, layered, and part of a

fluid assemblage of bodies, progesterone, technology, metrics, ambiguity, visuals, algorithmic spaces, urine testing wands, and unsupportive medical systems among many other items.

Collectively, these actors fundamentally shape how bodies are known and experienced. In the new few sections, I discuss how the findings also contribute to existing debates within traditional reproductive app literature, which include key threads of pedagogy, empowerment, quantification, visibility, time, and affect.

### *Flows of Pedagogy*

The findings contribute to conversations around the pedagogical features of reproductive technologies, by employing Barad (1998)'s concept of intra-action. One pattern in the literature review, was that women's embodied experiences are positioned by apps as less legitimate than data-driven or medical based knowledge, causing a separation of the users' self-knowledge (Hajkova & Doyle, 2024; Hendl & Jansky, 2022). For instance, Hendl and Jansky (2022) used a critical social constructionist orientation and looked at the discourse of app developers. They argued that any self-knowledge mediated through apps involves "bodily alienation", the body is positioned as an object of measurement, and any sense of embodied self-knowledge is severed (Hendl & Jansky, 2022, p. 41). When Hendl and Jansky (2022) examined the discourse of app developers rather than the lived experience of tracking itself, all the power and nuance found in the relationship between app and user was excluded.

My findings challenge this idea that technology creates "bodily alienation". While the scientific jargon was certainly privileged by apps in line with Hendl and Jansky (2022)'s findings, this was not necessarily privileged by participants over their embodied experiences when tracking. I found that knowledge generation was an oscillating process of intra-action,

which is in keeping with feminist new materialist literature (Andelsman, 2021; Karlsson, 2021; Zampino, 2020). For example, Zampino (2020) found that through menstrual tracking, embodied knowledge was created through overlapping intra-actions. Participants “learned to be affected”, where they became more sensitized to recognizing the various changes in their bodies in relation to apps (Zampino, 2020, p. 42). Overall, my findings were different to Hajkova and Doyle (2024)’s and Hendl and Jansky (2022)’s, because a new materialist approach looks at the practice of tracking as a process. In doing so, I found that no one form of knowledge was privileged by participants over another, rather an intra-active process took place where meaning emerged through knowledge entanglement.

In contrast to Hendl and Jansky (2022), I found the scientific features made participant’s embodied experiences feel more legitimized through the practice of progesterone tracking. Through an intra-active process, a reframing of what it means to be “hormonal” took place. More specifically, the technology helped materialize hormonal experiences, such as “good days” and “bad days”, as a normal well-functioning part of the reproductive cycle. I found the Proov app was suggestive of what might be happening within the body through high or low progesterone patterns, and through each participant’s unique engagement in the world, relevant and meaningful patterns emerged. A very similar process happened with Zampino (2020), except instead of indicating low or high progesterone levels, traditional apps suggested what symptoms might be present. My findings contribute in this sense, because technology does not need to explicitly suggest what symptoms are present for them to be incorporated into tracking assemblages.

My findings are in keeping with research that found feelings of appreciation and empowerment through the pedagogy features of menstrual tracking apps (Andelsman, 2021; Grenfell et al., 2021; Hamper, 2020; Levy & Romo-Avilés, 2019; Riley & Paskova, 2022). For example, Riley and Paskova (2022) found that participants experienced empowerment when they came to understand that their premenstrual experiences were a normal part of a fluctuating hormonal cycle. My findings contribute to this body of work because I examined new forms of reproductive technology, and in the context of those who are trying to conceive. Drawing the existing literature together with the current findings, my research suggests that when technology co-creates awareness over embodied experiences, a sense of empowerment and acceptance over the body may be gained. In summary, this section highlights how Proov and other digital reproductive health digital technologies are acting as pedagogical agents, and that assessment of these as simply alienating the users from their own embodied knowledge is missing some of the empowering, complex and nuanced elements that are part of users' experience.

### ***Empowerment in Flux***

Findings contribute to discussions over the empowerment-disciplinary tension in the literature, by recognizing the shifting and relational nature of tracking assemblages. The relational ontology revealed how multiple elements collectively produced experiences, which is why experiences with technology could be both empowering and disempowering. In taking a feminist new materialist perspective, my findings shift the question of whether technology is empowering or not, towards the more nuanced question of what kinds of actors mobilize certain experiences.

Aotearoa's unsupportive medical system could be seen as an example of an actor mobilizing an experience. In keeping with traditional reproductive app literature, participants described the technology as a means to exercise control over an inherently uncontrollable situation (Andelsman, 2021; Grenfell et al., 2021; Hamper, 2020; Riley & Paskova, 2022). As discussed in the pedagogy section, the pedagogy features of technology can be experienced as empowering. Participants in my study experienced a sense of excitement and proactive learning through the technology, within the context of a passive New Zealand health system. Participants of Grenfell et al. (2021) who were trying to conceive in the United Kingdom described a very similar pattern. Specifically, fertility apps became a place to learn about conception in the context of an overburdened medical system. Threading this together, findings indicate that the at-home technology may afford experiences of proactive empowerment as they operate within neoliberal and highly digitized settings, making the broader environment enacted in the tracking assemblage.

The ambiguous nature of the technology is another example of an actor mobilizing an experience. Previous literature described how any sense of empowerment and control was spoiled for participants when they did not meet the confines of the technology, in terms of following expected or 'normal' patterns (Grenfell et al., 2021; Hamper, 2020; Riley & Paskova, 2022). In this study, these confines were further complicated by the ambiguous and fragmented nature of the hormone tracking technology. For example, outcomes were drip fed over time, and results were provided without context or explanation of what they meant. As a result, participants frequently found it difficult to know whether they fit the criteria of normal or "good", and the lack of clarity or context acted as a constant call for self-improvement. For example, placing results into a graph without any context, except white space, created a sense of not being good

enough. Overall, experiences of empowerment and disempowerment were possible because agency does not belong to a single object or subject, such as technology. Rather a feminist new materialist perspective showed that agency was dispersed among many different actors, such as neoliberal settings or results without context, resulting in complicated experiences of technology that could be simultaneously empowering and disempowering.

### ***Materializing through Metrics***

The role of metrics in materializing certain experiences and understandings was a reoccurring element in the findings. The recent technology looked at in this study (Proov) prioritizes quantification, whereas signs and symptoms, such as mood tracking or bloating, found in traditional forms of reproductive apps has been excluded from Proov technology. According to Lupton (2013), the metrics employed by digital devices have a universal nature in the sense that numbers are widely accepted as devoid of meaning, assumptions, value judgements. As a result, numbers allow a comparison to be made, and the user is nudged towards self-improvement (Lupton, 2013). Notably, there was an *inability* to make a comparison in this study that further nudged participants towards self-improvement. As Janine explained, other menstrual apps provide statistics to allow a comparison to be made. However with this progesterone technology, there was nothing to compare the numerical result with. Participants knew high progesterone was good, and even though thresholds were met, a residual question remained of ‘how high is good enough’, due to the lack of statistics or normative standards. As a result, feelings of anxiety were produced and participants felt compelled to search online for a point of reference. Such activity fostered participants as becoming an expert in the hormone progesterone.

From a new materialist perspective, it was the absence of normative data within the trying to conceive assemblage that uniquely participated in materializing these experiences and lines of action. My findings showed that the change of actors in Proov, such as an absence of statistics and norms, have intensified aspects of self-improvement. In doing so, the findings contribute to Lupton (2013)'s notion of the quantified self, by further showing that it is not just numbers on their own that participate in lines of self-improvement. An absence within an assemblage can be just as active in materializing an experience and driving the user towards self-improvement.

Participants in this study rarely encountered metrics in an objective manner, in line with a range of qualitative literature on users' experiences of reproductive apps (Hamper, 2020, 2022; Lupton, 2015a; Zampino, 2020). According to Lupton (2016) the ways in which numbers are interpreted are never neutral because they are always implicated in relations, despite being widely accepted as objective. The findings from the present study provide support for this as metrics were not tracked in an objective manner and nor were numbers universally discrete. A relational ontology revealed that various entities, such as "6.2", do not exist or act in isolation despite their appearance of being universal. For instance, 'ambiguous yet precise' numbers, such as "6.2", was an agentic force that simultaneously produced unease and commanded attention for Janine, and led to the line of internet searching. This finding strengthens new materialist arguments that agency has a distributed and composite nature, because experiences were the result of power enacting locally within and between actors. This finding is useful because it means technological experiences of numbers cannot be treated as universal or replicable.

The *perception* of metrics being objective, accurate, and truth-telling was agentic in trying to conceive assemblages. For example, Claudia previously discussed with her doctor the possibility of having low progesterone, yet this was only “solidified” into something “actual” through witnessing low scoring progesterone numbers. Likewise, Kylie explained how the numbers moved her “possible” ovulation into something “not maybe” but “concrete”. In line with Lupton (2013)’s argument, the ways numbers were interpreted and understood were always entangled with participants’ unique engagement in the world. Participants made connections between the information presented by apps, such as graph fluctuations, and as they encountered their environment (e.g., “good days” and “bad days”), which is in line with the new materialist literature (Andelsman, 2021; Hamper, 2020; Karlsson, 2021; Lupton & Maslen, 2018; Zampino, 2020). Ultimately, a lively encounter occurred, where the suspicions afforded by doctors’ visits for example, were “solidified” or concretized through the metrics involved in tracking progesterone. In summary, by taking a new materialist approach this study revealed a distributed and composite nature of agency, where seemingly immaterial and easily overlooked elements, such as an absence, suspicions, or perceptions, uniquely participated in how reproductive bodies were experienced and known.

### ***Rendering the Invisible Visible***

The new progesterone technology explored in this study continues a longstanding Western tradition of rendering the body into transparent and knowable forms. Van Dijck (2005) describes how technology has participated in producing an ‘ideal transparent body’, assumed to be completely knowable through the right visualizing instruments. The implantation process, where a fertilized egg buries into the uterine lining, has traditionally never been seen. Blood tests

cannot pinpoint an exact moment, and ultrasounds cannot detect the microscopic level at which implantation occurs. Yet, through an assemblage of progesterone, urine, windows of time, progesterone measurements, and smartphone cameras, this previously concealed process became visible for participants to know.

A sense of tangibility produced in participant experiences is in line with Andelsman (2021)'s findings, who found menstrual tracking apps helped render previously inaccessible aspects of their bodies known in new ways. Andelsman (2021), for example, found that pleasure of tracking did not just come from the perceived objectivity of the technology, but instead the visualizing capacities that gave participants a "material record" or "overview" of their cycle. In this study, seemingly indeterminate items, such as the reproductive process of implantation, were materialized into something "concrete" and observable. Participants in this study described this as visual proof, or as Andelsman (2021) puts it, "traceable and actionable evidence" that their bodies had been performing optimally (p. 71).

Implicit in the new visualizing technology such as Proov, is an assumption that our "bodies remain untainted if we only touch them with our gaze" (Van Dijck, 2005, p. 16). However, the visualizing capacity of this technology did not neutrally reflect the inner process of "implantation". As Van Dijck (2005) argues, "peering into the body is [not] an innocent activity, which has no consequences" (p. 16). Accessing this previously concealed process reconfigured participants' experiences of the cycle. For instance, participants described an anticipatory affect, where they wondered if "something was implanting". Such thoughts would not normally have been considered without the technology. In this dynamic and lively activity, new understandings and experiences were agentic, where new lines of action were set up, such as taking medication

earlier, or pregnancy testing earlier. In this way, the visualizing affordances of recent technology is active in how bodies were being experienced and understood. Overall, my findings suggest that the body is not discovered by technology in a linear way, as what becomes observable is enacted in the assemblage itself.

### ***Time Reconfigured***

An important finding of the study was how progesterone measuring changed users' sense of time. This is significant because in the reproductive health technology literature time is rarely addressed. Time is typically and implicitly treated as something linear and stable in self-tracking research, and therefore operating in the background (Robson & Riley, 2019). Exceptions to this are feminist scholars, such as Hamper (2020), who argue that bodies are located differently in time and space, or critical scholars, who have argued that reproductive apps are disciplinary. For instance, Hajkova and Doyle (2024) argues that reproductive apps enforce a sense of "time discipline", where technology acts as a constant call to improve productivity (p. 122). One notable exception is Andelsman (2021), a new materialist contribution who argued that the temporality of the cycle emerged through menstrual tracking, and the bodies interior processes were reconfigured into a series of phases and intervals.

In line with Barad (1998)'s concept of intra-action and Deleuze's framing of time within their assemblage thinking, my research challenges linear ideas of items, such as time, being something preexisting or fixed. Deleuze drew from the philosophy of Henri Bergson, who through his theory of duration, rejected any traditional understanding of time as an external backdrop for lives to occur. Henri Bergson described how "usually when we speak of time we think of the measurement of duration, and not of duration itself. But this duration which science

eliminates, and which is so difficult to conceive and express, is what one feels and lives (Bergson, 1946, p. 11). From this perspective, progesterone tracking technology did not simply record time or observe the body in a linear manner, it actively reconfigured time by participating in how time was felt by participants.

The two-week wait, as the name suggests is widely understood as a fixed interval of the cycle, between ovulation and finding out if a pregnancy or period resulted. However, this was changed by the progesterone tracking technology because progesterone produced something new to know and to do, fundamentally changing the wait from something passive and drawn out, into something fast and active. I employed Barad (1998)'s notion of the apparatus in this study, where the boundaries of the measuring instrument and the object are enacted through the actual practice of measuring itself; they co-constitute each other. From this perspective, very act of measuring produced a new phase, an "in-between" (Kylie), or an "implantation window" (Deirdre), which reconfigured this two week wait.

My findings align with Andelsman (2021) in the sense that the cycle was also reconfigured through the practice of tracking. However, the introduction of a new hormone to track reconfigured the cycle with the addition of a new phase. A new hormone materialized a new "implantation window" not previously identified in the literature, thereby developing Andelsman (2021)'s understandings further. Ultimately, this finding strengthens Barad (1998)'s ideas of agential realism, by demonstrating that this is real phenomenon occurring at a particular point in time. Once this window had been encountered, the new knowledge could not be 'undone'. A new post-wait was created, where an inability to find anything out could reconfigure this time into "a million times longer" (Diedre).

### *Affective Experiences*

Another important contribution was recognizing the affective flows that take place in tracking assemblages. For example, anxious flows materialized through an assemblage of progesterone as foreign actor, technology that privileged progesterone, outcomes requiring four consecutive tests, partial results without comparative data, neoliberal self-responsibility, and readily accessible online lay knowledge communities. The mentally complex online territory described by participants builds on Geampana (2024)'s findings. In a sense, Geampana (2024) laid the groundwork by examining the kinds of data assemblages that take place, using a critical data studies lens and an in-depth case study method. Rather than solely focusing on the interplay between app and user, Geampana (2024) looked at how fertility apps brought together different types of knowledge networks together. For example, Geampana (2024) found that fertility apps empowered the user in lay knowledge production, by connecting them with lay knowledge online communities (i.e., social media sites and forums). My findings add nuance to this perspective by exploring the kinds of experiences that are produced through such exchanges. For example, the preoccupation and anxiety cultivated through uncertainty and online algorithmic spaces.

A feminist new materialist approach demonstrated that these knowledge exchanges were not simple or causal. Fertility apps did not connect users to online information in a linear fashion. Nor was online information extracted in a simple manner. Attending to the flux of the trying to conceive assemble, and the agentic flows that takes place develops prior research, which tended to stop at identifying knowledge networks Geampana (2024), or affective responses, such as

“anxiety” (Grenfell et al., 2021, p. 121) and “upset” (Andelsman, 2021, p. 68), or often overlooked emotion in tracking assemblages altogether.

A new materialist focus developed this body of work by shifting attention from identifying what emotions are present, towards examining *how* affect emerges, circulates, and enacts through the practice of progesterone tracking. In doing so, feelings and emotions are not located as discrete, internal, or universal states. Instead, affective experiences were locally situated and enacted with the items that they encountered. While research has described fertility apps as “hope technology in that they are emotionally charged with the hope for a future child” (Franklin, 2022; Hamper, 2020, p. 5), they have not explained exactly how hope is generated through technology. In my study, hope became tangible and “concrete” through the engagement of metrics, which participants perceived to be truth-telling. The “concrete” together with the sense of “success” from achieving thresholds, uniquely materialized hope into something inseparable from the technology itself. In this way, the findings of this study demonstrate how affective experiences are part of a continuum between the person and their environment. Importantly, findings build on existing research by creating strong evidence that affect is central to the experience of using this technology.

In summary, reproductive bodies are not born, but rather materialized through “world-changing techno-scientific practices by particular collective actors in particular times and places” (Haraway, 1992, p. 297). Through feminist new materialist theory, I was able to show how new progesterone tracking technology was significantly involved in meaning making, experiences, and lines of action through an ongoing process of entanglement. If I had not used feminist new materialist theory, progesterone as a newly tracked actor, would not have been accounted for in

materializing these new experiences and understandings. Many seemingly intangible items, such as hope, time, and implantation were materialized, and many previously overlooked actors were considered, such as ambiguity, absences, or *how* affect is co-created. In this way, my findings developed the literature further by strengthening some of the existing new materialist arguments in the context of recent hormone technology.

### **Practical Implications**

A new materialist approach showed how each item, or actor, that is introduced to a tracking assemblage has an influence on the user's experience. For instance, progesterone participated in the new understandings of a receptive environment, where conception became not only contingent on ovulation, but now also a supportive environment. Such understandings can change the way that people live or act. For example, taking medication earlier in contrast to medical advice as with Claudia's experience. In this way, this thesis tells us that the addition of new actors does not simply equate to greater fertility literacy or awareness.

In this vein, graphs, visuals, and metrics cannot be assumed to be neutral. I found that the ways in which these items were interpreted were always implicated in relations, and therefore never objective. Even though participants received positive progesterone results, placing this low into a graph without context created a not good enough sensation. I raise the question of whether this design feature was intentional. Particularly given the fact that progesterone supplements, such as "pro implantation" and "hormone boosting" supplements can be purchased through the app (Proov, 2024). Whether this was intentional or not, my findings suggest that there is need for more research that looks at the user's perspective in order to address these design features, which are widely assumed to be objective, but in practice limit empowerment.

Progesterone, as a newly tracked hormone, uniquely participated in certain kinds of experiences. This means that hormones cannot be treated equally. To illustrate, the same at-home hormone tracking system used in this study could track the pregnancy hormone (HCG) instead of progesterone. To provide context, HCG levels double approximately every 48 hours to indicate a viable pregnancy (Eskandar et al., 2011). As a result, the user would be able to witness, in real time, the growth or the demise of their early pregnancies through a hormone graph. Therefore, tracking HCG could raise a raft of ethical dilemmas. For example, a slowing of HCG levels in a miscarriage can occur over a few weeks, which means users could see the end of their pregnancy visually, before it happens physically a few weeks later (Hafez, 1984). Such ethical dilemmas start to make the criticisms raised in existing traditional reproductive app research around accuracy over predictions particularly salient (Hohmann-Marriott & Starling, 2022). Also, that hormone tracking research aimed at evaluating the accuracy of such technology is important (Bouchard et al., 2019; Mu & Fehring, 2023; Usala et al., 2024; Wegrzynowicz et al., 2022). Overall, my findings suggest that developers should not assume that hormones and actors can be added or swapped out in a formulaic fashion.

Developers, clinicians, or app users should also consider the fact that each person could experience the technology differently. My findings suggest that warnings could be created for those who struggle with daily reminders or watching results unfold over time. I carefully aimed to choose a 'low risk' hormone. In witnessing the affective experiences in this study, I was glad I had restricted it to those who have been trying to conceive for under 12 months. In common with participants' descriptions, I could see a lot of vulnerable people becoming triggered in this process of drip-fed information. Future research exploring recent hormone tracking technology

could consider these risks in terms of planning the research design. Developers could consider a one-time result as opposed to something gradual.

In seeing the agentic and affective flows that take place in relation to this technology, developers, practitioners, and policy makers should consider the broader networks involved. For example, social media and online spaces. Health practitioners may refrain from suggesting an app to someone if they struggle with preoccupation, due to the nature of online territories that the app connects users with. App developers might consider providing resources or comparisons within the app to help contextualize results for users, rather than leaving them to find out this information online. A mood tracker could also be incorporated into the technology, which encourages or prompts users to reach out to healthcare providers if they are struggling. Overall, my research suggests the affective aspects of technology should be considered at every level of design, service provision, healthcare professional recommendations.

Finally, my findings provide support for the use of feminist new materialist theory for future research on reproductive technology. The findings support new materialist arguments, such as agency was enacted through relations, and through an intra-active process involving both human and non-human entities. Technology is increasingly becoming more than just an app (e.g., urine wands and social media). Therefore, feminist new materialist theory would be fitting for all the new actors that are being introduced. Ultimately, each unique assemblage or arrangement could set up entirely new experiences and lines of action.

### **Strengths and Limitations**

A strength of the study is that it addressed a clear gap in the research, with an appropriate methodological framework that could provide a nuanced analysis. Through the feminist new

materialist approach taken in this study, I have been able to develop a better understanding the psychological experiences of using at-home progesterone technology while trying to conceive. If I had not taken a feminist new materialism approach, the nonhuman actors, such as progesterone, would not have been accounted for in producing certain experiences and understandings. Also, I would have missed the nuanced in depth understanding of what affects circulate through technology, and how bodies are experienced and known from the user's perspective. Relatedly, this research also looked at another hormone (progesterone) and phase of the cycle (luteal phase) separate to the dominant focus on luteinizing hormone, ovulation, or menstruation. As a result, new understandings and experiences were found, making an important contribution to the literature. For example, experiences are not just related to the egg or conception, they can be related to the uterine or receptive environment in which the egg implants.

A focus on the affective experience was also a novel contribution, and particularly relevant for those who are trying to conceive. Research has tended to stop short at simply identifying that 'anxiety' is present, or that participants were 'upset' that their cycles were framed as irregular (Andelsman, 2021; Grenfell et al., 2021). Moreover, much of the literature takes a discursive approach, which often fails to consider the affective dimensions of human-technological encounters (Lupton, 2018). However, this study has shown that affective experiences are not universal or only internal. Affective experiences are locally situated through the practice of tracking, and are part of a continuum between the person and their environment. Relating affect to feminist new materialist theory was productive for the current technical climate, because we can see how certain actors or flows that take place to produce these experiences. For instance, we now know that contextualizing results through the technology is

important, or that anxious and hopeful experiences are enacted in progesterone tracking assemblages while trying to conceive.

I found the use of diary entries in the data collection process a strength of the design process. At a distance it could appear as though the data from diaries did not contribute much towards the final themes, given that many of quotes were presented from the interview. However, I found the use of diaries essential to the research process because of the cyclic nature of menstrual cycles. More specifically, participants experienced a ‘roller coaster’ of emotions and experiences at different stages of the cycle, and the diaries captured these hot cognitive moments that I think interviews on their own would have flattened. From a feminist new materialist perspective, where nothing exists in isolation, the diary entries contributed to certain lines of conversation in the interview. As a researcher enacted in the research process, I used diary entries as markers of where to ‘go deep’ in the interview. In a sense, the diaries acted as a compass, allowing me to yield rich in-depth data through the interviews. I have attached a diary entry in the appendix as an example of how these themes can be traced back into the diary entries (see [Appendix F](#)).

Responsible intra-action also involved companioning with participants through these diaries. Given that trying for a baby can be stressful and that the psychological implications of this technology was essentially unknown, diary entries acted as an ethical means to monitor any heightened distress during progesterone testing. Companioning in this process involved a delicate balance of trying not to intervene too much in the sense that the data would speak more to the participants experiences, while also recognizing that I am already enacted in the process and how I respond invariably shapes the research outcome. For example, there was a moment

when Claudia was becoming “on edge” through the uncertainty experienced in the testing days. She asked me what to expect over the next days and I made a more ethical-based decision to tell her a bit more about how it works (e.g., at least three positive tests are needed to confirm ovulation), rather than letting her find out for herself. Overall, diary entries were a fitting method for feminist new materialism theory, and Barad (1998)’s ethico-onto-epistemology, because I found the ethics, ontology and epistemology were essentially inseparable.

Considering the limitations, having the photos of app visuals and hormone graphs through diary entries provided me with context as a researcher, which was important given I was enacted in the research assemblage. For this reason, I felt a certain ‘blindness’ when participants talked about social media and online material that they were using. It took me longer to catch up to understanding what they were describing. Relatedly, I only received diary entries on the progesterone testing days. As a result, there were times in the cycle where that could have generated really interesting data that were missed. For example, almost all participants pregnancy tested straight after the progesterone testing window had concluded, and I felt this would have been a really important moment to capture.

A strength of this study was that it looked at participants 30-35 years old, as existing research has predominantly been carried out on those under 30 years old (Kazakoff et al., 2025). Having these perspectives are important given that there is a strong biomedical discourse of the thirties becoming a critical time for reproduction (Bühler, 2021, 2022). At the same time, the sample was homogenous, in terms of being white, relatively privileged, cisgender women, which is similar to most existing research in this area (Kazakoff et al., 2025). The sample was also homogenous in the sense that all participants had experienced pregnancy loss. The homogeneity

of the sample gives us something meaningful to say about a shared experience of particular group of this size (Sullivan et al., 2024). However, the findings are limited in that they cannot be generalized or be considered representative, which is consistent with the aims of this qualitative study.

### **Future Directions**

Research should continue to explore users' perspectives of recent forms of hormone tracking technology, given that this study demonstrated the importance of understanding this, and that there is a lack of research in this area. In addition, research could also repeat a similar study exploring saliva-based hormone tracking technology. Finding similarities and differences between different bodily fluids could provide some direction in the development of technology. It could be that the strong pregnancy focus found in my research was related to a similar form of testing (i.e., urine-based hormone wands). After seeing how agency is enacted through various non-human actors, I have started to see all the numerous elements that could be participating in tracking assemblages. Having a greater awareness of which actors shape certain experiences could give direction for in technology development. For example, choosing urine or sweat as a bodily fluid for hormone tracking to create certain kinds of experiences over others.

Research on traditional reproductive apps has predominantly focused on either menstruation or ovulation, and the literature on hormone tracking technology centers on ovulation and luteinizing hormone. When exploring progesterone as a newly tracked hormone, I found significantly different understandings and experiences from the users' perspective. To this end, there are many other hormones within tracking assemblages that could uniquely participate in how bodies are experienced and understood. For example, other at-home technology measures

AMH (anti mullerian hormone) (The FemTech Revolution, n.d), which could create experiences of urgency, and materialize ideas of needing with reproduce within a timeframe, given that the hormone is used as a marker for “ovarian reserve” (i.e., how many eggs are left). Overall, future research could carry out a similar study on technology that employs different hormones to find out what other experiences are being created. Although, this thesis indicates that care should be taken in designing the ethical framework, given that each hormone could produce different affective experiences and understandings, as found in this study.

Future research could look at existing or long-term hormone tracking users. The main theme in this study was around progesterone as a new actor, and it would be interesting to see what the similarities and differences would be for those who were already tracking this hormone for some time. When participants as novice users engaged with the technology over the course of their menstrual cycle, they started to become experts in the hormone progesterone. Therefore, existing users may show that different experiences are created over time. Now that this study has been completed, there is an awareness raised around what kind of experiences are produced (e.g., anxiety) that could be taken into consideration in terms of research designs. It could be reasonable to explore those who have been trying to conceive for some time, and particularly given there was huge interest from those who had been trying over 12 months.

### **Final Reflexive Thoughts**

Through this study, and as evidenced through my algorithms, I feel an even deeper relationship to the hormone progesterone. My first encounter with progesterone was a good one. As a described earlier in chapter two, I saw it as a ‘nicer’ hormone. I had never experienced low progesterone, and therefore it was something I never worried about it. However, I witnessed how

progesterone materialized anxious experiences and how it held the potential to “shatter dreams” as Kylie described it. Therefore, my connection with progesterone is not necessarily as easy going or positive as I had initially felt.

Such findings were initially unexpected, because I tried the technology out for this study as a trial run, and I was particularly underwhelmed with the experience. Five progesterone benchmarks were recorded by my app in an unremarkable and seemingly orderly fashion. However, in viewing participants’ experiences, I saw how these same five benchmarks produced significantly different experiences and understandings. For example, my results were exactly the same as Deirdre’s, yet I was not “rolling in a state of overconfidence” nor did I start seeing my body as a “supportive environment”. Hence, I found a new materialist lens particularly fitting because it demonstrated that the number on its own did not produce certain experiences. Instead, it was participants’ unique assemblages, including a hoped-for future baby.

In terms of my positionality, I can see how my past experience was enacted in the research project. Sitting in uncertainty was one of the most difficult things for me, and so I can see how items relating to this, such as waiting and ambiguity, were made to matter in this research project. As an insider, the effort I took to build relationships and create a space where participants felt they could share candidly about their experiences influenced the depth and nature of the research data. As someone with a shared history, I was able to generate rich insights into the feelings and emotions involved in tracking that an outside may not have achieved. Even the fact that I chose a research question relating to the affective experiences shows how my past history is enacted in this work.

As my first research project, the experience was quite different from past coursework where I engaged with research from quite a removed position. In this study, participants were real living, breathing, and feeling people. I felt a great sense of responsibility and ethics of care given I knew how difficult and isolating the experience of trying to conceive can be. I felt privileged to witness a small part of their journey and be part of their highs and lows. I was not a detached neutral observer, I too was squinting at the pregnancy test photos they shared, hoping to see any trace of a faint pink line. I was invested in their process and experienced joy when participants became pregnant, and in terms of the affective flows that went beyond the apparatus of the current study, participants kept me updated with pregnancy scans and further milestone achieved. I shared the great news with my supervisors who were also delighted and invested in their journeys, thereby illustrating the continual flows taking place. Overall, the research project has been such a memorable and meaningful experience that has become a part of me.

## **Conclusion**

In addressing a gap in hormone tracking technology research, this study explored users' experiences of at-home progesterone tracking technology when trying to conceive. I looked at the experiences of five participants who used progesterone tracking technology while trying to conceive, through diary entries and semi-structure interviews. In using reflexive thematic analysis informed by feminist new materialist theory, I demonstrated how progesterone, as a new actor within the trying to conceive assemblage, offered novel ways of knowing and figuring the body out. The agency enacted in these assemblages was distributed and composite, where multiple human and non-human actors materialized learning experiences, resulting in ambivalent experiences of empowerment.

With progesterone's new entry, the body was reconfigured as a well-functioning environment, and the concept of 'implantation' was brought into a lived reality. As a new hormone to track, progesterone reconfigured the 'two-week wait'. A new phase with new tasks and opportunities to know the body better ultimately changed how participants experienced time. Feelings of hope and anxiety materialized through the way progesterone participated in this assemblage. Anxiety was felt episodically through unclear outcomes that were drip-fed over time, while hope was materialized into something tangible and concrete when new thresholds were met. Overall, a relational ontology revealed how these new experiences and understandings became inseparable from the very practice of tracking.

Through the use of feminist new materialism theory, this thesis demonstrated the addition of a new hormone does not simply equate to greater fertility literacy or awareness. Rather a lively and dynamic assemblage of nonhuman and human actors encountered one another, producing new ways of knowing, feeling, and experiencing the reproductive body. In this way, this thesis highlights the need for more nuanced understandings of users' perspectives, one that attends to the affective and material dimensions of new at-home reproductive technologies.

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## Appendix A. Recruitment Advert

*[Social Media Written Post]:* ✨ Are you trying to conceive and tracking your cycle? ✨

Kia Ora! I'm looking for people who have been trying to conceive for between 6-12 months, and who would like to participate in a study exploring the experience of using the "Proov" fertility app and related progesterone-tracking system.

### Who can participate?

- ✓ Aged 30-35 years
- ✓ 6-12 months trying to conceive
- ✓ Have a menstrual cycle
- ✓ Actively tracking ovulation (e.g., LH tests, cervical mucus, or other methods)
- ✓ Live in Aotearoa NZ
- ✗ Not on progesterone related hormone medication (e.g., birth control pill or IVF)

### What's involved?

- ◆ Track one full cycle using the Proov fertility app & PdG at-home urine testing kit (provided).
- ◆ Complete 5 short diary entries on testing days via text/message.
- ◆ Participate in an interview reflecting on your feelings and experience.

🕒 Total time commitment: **3-3.5 hours**

Your participation will help us better understand the experience of closely monitoring hormone levels for those trying to conceive. Wāhine Māori and those from ethnic or sexual minorities/takatāpui are warmly invited to participate!

**Want to know more?**

get in touch with my study specific contact details: [IsabelHuyser.Pearson.1@uni.massey.ac.nz](mailto:IsabelHuyser.Pearson.1@uni.massey.ac.nz)

Ph: [REDACTED] Or sign up here: <https://forms.office.com/r/BjAUDVy4Zh>

*This project has been reviewed and approved by the Massey University Human Ethics Ohu Matatika 1, Application OMI 25/08. If you have any concerns about the conduct of this research, please contact the Chairperson, Massey University Human Ethics Ohu Matatika 1, email [humanethics1@massey.ac.nz](mailto:humanethics1@massey.ac.nz)*

[Attached image to post and flyer print image]:

# ARE YOU TRYING TO CONCEIVE?

**I am a Massey University student completing a Masters thesis research project on the use of hormone-tracking fertility app systems.**

**I would like to know what the experience of recent at-home progesterone-tracking technology is like for those who are trying to conceive, and what sort of emotions and feelings may come up.**

**Take part in this study and help me understand more about hormone-tracking technology and fertility, as you gain more information about your progesterone levels!**



**I am interested in hearing a diverse range of experiences, and wāhine Māori and those from ethnic or sexual minorities are warmly invited to participate.**

**For more information connect via the study specific details:  
text: [REDACTED] or email:  
IsabelHuyser.Pearson.1@uni.massey.ac.nz**

**Are you willing to talk about your feelings and experience while tracking your cycle**

**Are you 30-35 years and living in Aotearoa NZ?**

**Would you like more information about your progesterone levels?**

*This project has been reviewed and approved by the Massey University Human Ethics Ohu Matatika 1, Application OM1 25/08. If you have any concerns about the conduct of this research, please contact the Chairperson, Massey University Human Ethics Ohu Matatika 1, email humanethics1@massey.ac.nz*

## Appendix B. Request Letter to FertilityPlus Te Whatu Ora



To: Fertility Plus Te Whatu Ora

Greenlane Clinical Centre

[fertplys@adhb.govt.nz](mailto:fertplys@adhb.govt.nz)

(09) 630 9810

Kia ora! My name is Isabel, and I am a Massey University psychology student completing my master's thesis research project on the use of fertility hormone tracking apps by those who are trying to conceive. I am interested to know what the experience of closely monitoring and receiving PdG (progesterone metabolite) levels is like, and what kinds of emotions and feelings may come up as individuals wait to see whether they are pregnant or not.

I have had my own fair share of fertility difficulties and so this project is especially meaningful to me. My own experience led me to work in peer support roles with Red Nose and Sands Australia, where I have supported others in the ups and downs of their fertility journeys. This personal and professional experience has led me to see firsthand some of the emotional struggles and uncertainty that many individuals face. For this reason, it is really important to me that this piece of research contributes positively to those who are trying to conceive.

With your permission, I would like to provide some recruitment advertisement flyers in physical form for the Women's health and fertility clinic. I am looking to recruit six participants, and if participants are interested in the study, they will be able to express their interest through the contact details provided in the advertisement. I have included a participant information sheet to provide you with more details about the study.

Thank you for your time and I look forward to discussing this further.

Sincerely,

Isabel Pearson

[IsabelHuyser.Pearson.1@uni.massey.ac.nz](mailto:IsabelHuyser.Pearson.1@uni.massey.ac.nz)



## Appendix C. Participant Information Sheet



# Participant Information Sheet

## Introduction

Kia ora! My name is Isabel, and I am a Massey University psychology student completing my Masters which includes a research project. My research project is on the use of fertility hormone tracking apps by those who are trying to conceive. There is a new generation of technology that is designed to help people conceive, including “Proov,” a urine detection wand and app combo that allows people to get a sense of their progesterone levels. I am interested to know what the experience of closely monitoring progesterone level readings is like when people use Proov, and what kinds of thoughts, feelings, and emotions may come up as they wait to see whether they are pregnant or not.

I have had my own fair share of fertility difficulties and so this project is especially meaningful to me. My own experience led me to work in peer support roles, where I have supported others in the ups and downs of their fertility journeys. This personal and professional experience has led me to see firsthand some of the emotional struggles and uncertainty that many individuals face. For this reason, it is really important to me that this piece of research contributes positively to those who are trying to conceive.

This sheet will give you some more information about the study. It is important for you to know whether or not you would like to participate. There is a lot of information on this sheet to consider, and you may have further questions. So, I would be happy to talk you through this information if you would find this more helpful, and of course you may also like to talk to friends or whānau before you decide. I appreciate your interest if you choose to participate. If not, I thank you for taking the time to consider this project.

### **What is the aim of this research project?**

The aim of this project is to explore what kinds of experiences are created when users closely track their cycle through a progesterone hormone-tracking fertility app.

### **Who are we seeking to participate in the project?**

I am looking for participants who are:

- Age 30-35 years old.
- Have menstrual cycles.
- Living in Aotearoa New Zealand.
- Actively trying to conceive, and have been trying for 6-12 months.
- Not on progesterone-related hormone medication (e.g., birth control pill or IVF), as this can cause false readings in the Proov app.
- Currently tracking their peak fertility or ovulation (whether this be through cervical mucus, temperature monitoring, a luteinising hormone (LH) test, or something else
- Have a smartphone and the ability to download the free Proov app (<https://proovtest.com/pages/app>) and WhatsApp (for text messaging purposes). Should

you decide to participate you will be given a Proov testing kit. *Please note. You will be required to specifically use the app Proov and the test kit 'confirm PdG', as this study is specifically looking at your experiences of tracking the hormone progesterone with Proov while trying to conceive.*

### **What does the Proov app do?**

Proov is a urine wand and app combo that allows users to measure “PdG,” a urine progesterone metabolite<sup>2</sup>. More simply, PdG is a marker for the hormone progesterone – it gives people an idea of their progesterone levels. Progesterone is a hormone that rises in the second half of the menstrual cycle. It is an important hormone for pregnancy as it helps to create a receptive environment and supports early pregnancy. Having an idea of your progesterone levels is helpful for people trying to conceive, because if they are low, it is often quite easy to treat. Please note that the PdG levels in Proov are not the same as progesterone levels taken in a blood test because the measurement used in urine is not the same, this is why I describe PdG as a ‘marker’ for the hormone progesterone.

### **If you participate, what will you be asked to do?**

If you participate, you will need to:

1. Take part in a pre-study meeting to discuss the study and how to use the test (approximately 30 mins).
2. For one cycle, track your menstrual cycle using the Proov fertility app. Tracking includes:
  - Manually logging your day 1 of your period.
  - Manually logging your peak fertility/ovulation in the app.

- Carrying out 5 urine tests as prompted by the app (which is a similar process to an at-home pregnancy test).
- For each of the 5 tests, you will need to write (or voice message) a short diary entry via WhatsApp to me, as the researcher, reflecting on the hormone test result (includes screenshot of graph provided by Proov and any other photos you wish to include that help you share your experience with me, and will take approximately 15 minutes for each of the 5 days).
- Waiting to see if you are pregnant.

3. Participate in an interview where you will discuss and reflect on your experience of using Proov and trying to conceive (approximately 50-60 minutes).

Interview questions might include:

- What was it like seeing your hormones charted on a graph?
- What was it like monitoring your cycle closely?
- What did you learn during this process?
- What are some of the emotions, feelings, thoughts that came up?
- What did you find useful about the app? Unhelpful?
- What was challenging during this cycle?
- What were you thinking when you captured this photo?

I will send you transcripts of your interview via email and you will have the opportunity to review and amend these, by adding or retracting data to explain what you said or remove it, for up to two weeks upon receiving before they become part of a combined dataset.

If at any point in the study you would like more resources or details of further support on trying to conceive, please see the information at the end of this document. In addition, after the interview, you are welcome to arrange a meeting or call with me, where I can talk you through what resources are available.

During the study, if I haven't heard from you during expected test times, I will follow up with a text, call, or email to see if you are ok.

Overall, taking part in this study will require approximately 3-3.5 hours of your time.

As part of this study, participants will have access to the Proov testing kit that will give more information about their own PdG levels. People who complete the study will also receive a \$50 gift card as a thank you for their contribution.

### **Is there any risk of discomfort or harm from participation?**

Tracking your cycle will give you reminders about your menstrual cycle and fertility efforts.

While gaining PdG information can be helpful, this information could also be upsetting, especially if it showed low PdG. If this would be too stressful for you, I do not recommend taking part in this study. If you find the PdG app results concerning or you are worried about adequate progesterone levels for pregnancy, I advise you contact your healthcare provider. If progesterone levels are low, your healthcare provider may suggest progesterone supplementation for support. I have also provided you with links to some factsheets that contain information about the role of progesterone and progesterone support, and I can talk you through them if you want me to. Proov PdG tests are not intended to replace medical advice. Proov PdG testing is designed for informational purposes and will not increase your chances of pregnancy during this cycle. It

is also important to know, PdG feedback from one cycle is not a complete reflection of your fertility.

Discussing and reflecting on the experience of trying for a baby through interviews and texts/messages could also be stressful. If you think discussing thoughts, emotions, and feelings while trying to conceive would be particularly stressful, I do not recommend taking part in this study. I also remind you that you may stop, pause, or skip questions in the interview, and take extra time to complete diary entries if needed.

### **What information will be collected by the researcher for this project, and how will it be used?**

Data I will ask for to manage the study and which will only be kept for the duration of the study (approx. one year):

- I will ask you for your name, mobile number, email address, and a postal location that the test kit can be delivered to (note, the kit consists of a urine sample cup and 5 urine detection test wands. You are not required to return this kit). This information will be kept confidential and will only be seen by myself (as the researcher) and my supervisor.
- Information about your cycle will also be collected during the study for planning, including the days of your cycle and what day your period starts.
- Screenshots of the Proov app test results (total of 5). The screenshot of your Proov results will contain no identifiers.

The data I will use for my analysis and reports:

- Diary entries in the form of WhatsApp messages (text or audio, audio messages will be transcribed) and any other photos you share. For example, you might want to share a picture of your bathroom if it helps you describe your experience of using Proov. If you take additional photos these will be used to facilitate the interview and may also be used in reports if they do not identify you.
- Your interview with me will be video recorded on zoom and transcribed. Once transcribed, the video recording will be deleted.
- All transcribed data (diary entries and interviews) will be de-identified. Deidentified data will be stored securely through Massey OneDrive for 5 years(which it will then be destroyed). Extracts of which, including diary entries or quotes from interviews, will also be included in my reports which will be available indefinitely, for example, on the Massey University thesis database or in any academic publications that come out of this project.

### **What about confidentiality?**

A pseudonym will be used for the report and all identifying information will be removed or changed from your transcripts and diary entries. For example, if your job title might help identify you, we would change it to a more generic description e.g. “head teacher of a rural primary teacher” would be changed to “teacher.”

Confidential information, such as your address of where I send the testing kit, will be stored on a secure university server (Massey OneDrive) and deleted at the end of the study, as outlined above.

### **How the results will be disseminated?**

Completion for the final report is expected to be at the start of next year. The final report will be emailed to you. The research could be published in academic journals or presented at academic conferences. Any quotes presented from your diary entries or interview would be deidentified as outlined above.

### **If you agree to participate, can you withdraw later?**

You can withdraw at any time during the study data collection period. Once you receive your interview transcript, you will have a further two weeks to withdraw from the study, after which your data will be part of the data set and cannot be retrieved.

### **What information will be collected by Proov, and how will it be used?**

Proov is a commercial company based in the USA and is separate to this research project. I therefore cannot guarantee the total security of your data uploaded onto Proov. Proov provides the following information as to how they use data, before you agreed to participate in this project, please decide whether you are happy with their assurances, which are:

#### **What information will the Proov app collect?**

The Proov app may collect your name, contact information you provide (e.g., email address), demographic profile, preferences, self-reported observations, customer information feedback, and any photos or images you upload (e.g., test strip photos).

#### **What happens to this data provided to the Proov app?**

The information Proov collects is used to better understand what your preferences are in regard to Proov services. It is used for internal record keeping; to improve products and services;

occasionally to make contact for market research purposes; to customise website information based on your interests; to perform marketing analytics and to gain a better understanding of customer behaviour and improve customer experience.

The information you provide in the Proov app may be used for advertising within the app. For example, offering a discount code for more fertility related Proov testing kits, or other fertility related products from Proov.

### **Is this information provided to Proov secure?**

Proov states that it will not disclose your personal information. To prevent unauthorised access or disclosure Proov have physical, electronic, and managerial procedures to safeguard the information collected online. Proov uses high-level encryption software to prevent third party access.

Proov states that it will never sell, distribute, or lease your personal information to third parties.

Proov states they can only disclose your information unless you have specifically provided permission or if required by law.

The website link to these terms and conditions for Proov are here:

<https://proovtest.com/pages/terms>

<https://proovtest.com/pages/privacy-policy>

### **Can I remove my Proov data?**

Yes, you may permanently delete all your data from Proov at the end of the study. Proov may continue to use your data to improve products and services until you decide to delete this. To

carry out permanent removal of all your data, scroll down to the bottom page of your account settings page within the app and select 'delete account.'

### **Any questions?**

If you have any questions at all, please do not hesitate to contact me. I would be more than happy to discuss these. I appreciate that this sounds like a complex project, so I am happy to talk through in person to clarify any elements.

In closing, I hope that you will enjoy participating in the study, that you may find it interesting to try a new technology and to reflect with me on what that experience is like while using it. Receiving progesterone feedback may help you understand your cycle more, and it might help you to identify any potential progesterone-related issues. At a broader level, I hope that this research can raise awareness around the highs and lows individuals face while trying to conceive and offers insight into how technology may ethically evolve to support these individuals.

Sincerely,

**Isabel Pearson**

Study specific contact details:

IsabelHuyser.Pearson.1@uni.massey.ac.nz



*This project has been reviewed and approved by the Massey University Human Ethics Ohu Matatika 1, Application OMI 25/08. If you have any concerns about the conduct of this research, please contact the Chairperson, Massey University Human Ethics Ohu Matatika 1, email [humanethics1@massey.ac.nz](mailto:humanethics1@massey.ac.nz).*

## Support Resources

below are the details of different resources and support services that you may wish to contact for information/support.

[Fertility NZ](#) - Support groups: <https://www.fertilitynz.org.nz/events>

Phone support: 0800 333306

Email support: [support@fertilitynz.org.nz](mailto:support@fertilitynz.org.nz)

factsheet brochures: [www.fertilitynz.org.nz/services-1](http://www.fertilitynz.org.nz/services-1)

videos: <https://www.fertilitynz.org.nz/webinars>

[Depression Helpline](#) - 0800 111 757 or free text 4202 To talk to a trained counsellor about how you are feeling or to ask any questions

[Anxiety NZ](#) - 0800 269 4389 (0800 ANXIETY)

[Lifeline](#) - 0800 543 354 (0800 LIFELINE) or free text 4357 (HELP)

[Healthline](#) - 0800 611 116 Health advice from professional healthcare providers

## Fertility New Zealand Support Groups

There are many support groups run by Fertility New Zealand throughout New Zealand. There are both in-person groups and online groups. If you need more information on this or support you can email [support@fertilitynz.org.nz](mailto:support@fertilitynz.org.nz).

Online Chat and [support@fertilitynz.org.nz](mailto:support@fertilitynz.org.nz)

Connect The Online *Chat and Connect* group meet on the second Wednesday of each month. Our next meeting is at 7:30 pm on Wednesday, 12 February 2025.

Click here: [Zoom link](#).

Click here for more information and future dates [Events | Fertility NZ](#)

Auckland

[aucklandsupport@fertilitynz.org.nz](mailto:aucklandsupport@fertilitynz.org.nz)

The Auckland group meets on the third Thursday of each month. At the Horse and Trap, 3 Enfield Street, Mt Eden (private room downstairs).

Click here for more information and future dates. [Events | Fertility NZ](#)

Waikato

[hamiltonsupport@fertilitynz.org.nz](mailto:hamiltonsupport@fertilitynz.org.nz)

The Waikato group meet bi-monthly on Sundays.

Read more about this group here. [Events | Fertility NZ](#)

New Plymouth

[aranakisupport@fertilitynz.org.nz](mailto:aranakisupport@fertilitynz.org.nz)

The Taranaki group meets on the first Tuesday of each month.

Click here for more information and future dates. [Events | Fertility NZ](#)

Wellington

[wellingtonsupport@fertilitynz.org.nz](mailto:wellingtonsupport@fertilitynz.org.nz)

The Wellington group meets bi-monthly

Read more about this group here. [Events | Fertility NZ](#)

Nelson

Read more about this group [here](#). [Events | Fertility NZ](#)

Christchurch

[christchurchsupport@fertilitynz.org.nz](mailto:christchurchsupport@fertilitynz.org.nz)

The Christchurch group meet on the last Tuesday of each month, at 7:00 pm.

Click here for more information and future dates. [Events | Fertility NZ](#)

Queenstown

[queenstownsupport@fertilitynz.org.nz](mailto:queenstownsupport@fertilitynz.org.nz)

The Queenstown group meets on the second Monday of each month at 7 pm, at 18 Glenda Drive, Queenstown.

Click here for more information and future dates. [Events | Fertility NZ](#)

Dunedin -

[dunedinsupport@fertilitynz.org.nz](mailto:dunedinsupport@fertilitynz.org.nz)

The Dunedin group meet monthly on Thursdays 7:30 pm. At 607 Highgate,  
Māori Hill, Dunedin.

Click here for more information and future dates. [Events | Fertility NZ](#)

## Appendix D. Participant Consent Form



# Participant Consent Form

Please initial next to the statement if you agree:

I have read and understood the participant information sheet and the study aims.	
I confirm that I meet the criteria for participation that is explained in the information sheet.	
I have been given enough time to consider whether or not to participate in this study.	
I understand that taking part in this study is voluntary (my choice).	
I understand that I may end the interview or stop testing at any point.	
I understand that I will have the opportunity to read and amend my transcript, and I have up to two weeks to amend or retract this data upon receiving it.	
I understand that the deidentified transcript and extracts from this study may be used in reports and publications arising from the research.	
I understand that participating will consist of tracking my menstrual cycle, urine tests and diary entries as prompted by the Proov app, and an interview reflecting on my experience of this time.	

I understand the potential risks or discomfort involved as explained in the information sheet.	
I understand that the PdG tests are not intended to replace medical advice, and this feedback is not a complete reflection of my fertility.	
I have read and understood the participant information form and agreed to the processes outlined in it.	
I understand there is no payment offered for this study. <i>Please note. A \$50 gift card as koha will be provided for acknowledgement of your time and contribution.</i>	

Signature of participant: \_\_\_\_\_ Date:

Name of participant: \_\_\_\_\_ Date:

## Appendix E. Interview Schedule



# Interview Schedule

Note: The following are indicative questions as the interview is intended to be a semi structured, open ended conversation to facilitate rich and in-depth data.

<b>Introduction</b>
<p>Welcome participant.</p> <ul style="list-style-type: none"> <li>- Check in how they have been today.</li> <li>- How have they found the study process so far and that they have seen the resources provided in email.</li> <li>- If connection difficulties, try the same link and will phone or text if needed through WhatsApp.</li> </ul>
<p>Introductions and invitation to open:</p> <ul style="list-style-type: none"> <li>- Ask if there is any way they would like to open the interview in particular (e.g., karakia, pepeha, Christian prayer).</li> </ul> <p>(Note. would have already introduced myself, role and background in initial meeting).</p>
<p>Explain the purpose of today</p> <ul style="list-style-type: none"> <li>- Reflecting on the experience of closely monitoring progesterone and seeing hormonal patterns play out.</li> </ul>

<ul style="list-style-type: none"> <li>- Referring to diary entries and going into a bit more detail.</li> <li>- Interested in their perspective (no right or wrong answers).</li> </ul>
<p>Check if they have any questions about the study so far.</p> <ul style="list-style-type: none"> <li>- Remind them of information on participant information form: At any point they would like to take a break, stop, or don't want to answer certain questions, to let me know.</li> </ul>
<p>Ask to start recording &amp; record.</p>

### **Entry into interview questions**

After going through the Trying to conceive (TTC) journey myself, I thought this research project would be an opportunity to explore what the experience is like trying to conceive with this recent hormone-tracking technology, which seems so advanced and involved in our everyday lives now

- first of all, it would be good to know a bit about you and what led you to want to be part of this study, and then I'll go on to ask you some questions around what the experience has been like.
- Would you be able to tell me in your own words, what were you hoping for when you signed up for the project?

*Prompts: What were your expectations of the technology - of what it might help you with?*

*[Generic prompts throughout schedule as needed:*

- *Can you tell me a bit more about...*
- *Can you give me an example...*

- *Why did you think that...*
- *So it sounds like your experience was (summarise) ...does that sound about right or was there more than that?]*

### **Introductory questions around the experience with Proov (approx. 3 mins)**

- So going on to think about your experience of using Proov, can you tell me what it was like when you first got it, what did you think or feel?
- Talk me through how the baseline test went, what was it like to do that first base test? What were you thinking and feeling at the time?  
*Prompt: What was it like to see your progesterone levels in a graph?*
- Tell me what it was like to log your ovulation in the app and wait to start testing? *Prompt: What were you thinking? What were you feeling? (while you waited for Proov to tell you to start testing?)*

### **Test day reflections (spend approx. 30-40 minutes overall)**

#### **(first progesterone test (not including baseline test) – spend 5-10 mins total here):**

- So after ovulation, you received a notification to test from Proov, tell me about that progesterone test. Talk me through what you did and what you were thinking and feeling when you used it?
- I have your screenshot here and it had..... How did you feel about that? *Prompts: What were you thinking? When you saw the result was it reassuring, confusing, unsettling, hopeful?*
- I've got your photo and diary entry here, *(ask them if its ok for me to share the image on Zoom using 'share screen' so we can both look at it together)*, can you tell me a bit more

about this photo on day (...). *Prompts: what was happening for you here? What were you thinking about when you captured this photo? What were you feeling?*

*I noticed....]*

- I know in your message to me you said (...), do you want to tell me a bit more about that? *Prompt: What led you to say that?*
- Sometimes people start trying to connect the test results to how their body feels, did you notice yourself paying attention to certain physical sensations or symptoms when you got this progesterone reading? *Prompts: Did these sensations make sense to you given the progesterone reading you had? Did you think you could match the readings to sensations in your body, for example if you had twinges.*
- Having that progesterone reading, how did that impact you, not just after you've done the test, but the rest of your day? *Prompts: Did you think about it later or did you forget about it? Did you avoid certain things like exercise, or maybe changed what you ate/drank? Or maybe there was no difference to what you did? Why do you think it influenced you in that way?(or why do you think there was no difference for you?)*
- Looking back on that first test day, is there anything else you remember, did you talk about it with other people? Or think about the results later?

**(Second progesterone test – spend 5-10 mins total here):**

- Thinking about your next test now, where was your headspace when you went to do the 2nd test?
- I have your screenshot here and it had... *Prompt: How did you feel about that? What were you thinking? what do you make of this result?*

- I've got your photo and diary entry here, (*ask them if its ok for me to share the image on Zoom using 'share screen' so we can both look at it together*), can you tell me a bit more about this photo on day (...). *Prompts: what was happening for you here? What were you thinking about when you captured this photo? I noticed....*
- I know in your message to me you said (...), do you want to tell me a bit more about that? (*Generic prompts*)
- Sometimes people start trying to connect the test results to how their body feels, did you notice yourself paying attention to certain physical sensations or symptoms when you got this progesterone reading? *Prompts: Did these sensations make sense to you given the progesterone reading you had? Did you think you could match the readings to sensations in your body, for example if you had twinges.*
- Having that progesterone reading, how did that impact you, not just after you've done the test, but the rest of your day? *Prompts: Did you think about it later or did you forget about it? Did you avoid certain things like exercise, or maybe changed what you ate/drank? Or maybe there was no difference to what you did? Why do you think it influenced you in that way?(or why do you think there was no difference for you?)*

**(Third progesterone test – spend 10 mins total here):**

- Thinking about your 3rd test now, where was your headspace when you went to do the 3rd test?
- I have your screenshot here and it had..... *Prompt: How did you feel about that? What were you thinking? what do you make of this result?*

- I've got your photo and diary entry here, (*ask them if its ok for me to share the image on Zoom using 'share screen' so we can both look at it together*), can you tell me a bit more about this photo on day (...). *Prompts: what was happening for you here? What were you thinking about when you captured this photo? I noticed....*
- I know in your message to me you said (...), do you want to tell me a bit more about that? (*Generic prompts*)
- Sometimes people start trying to connect the test results to how their body feels, did you notice yourself paying attention to certain physical sensations or symptoms when you got this progesterone reading? *Prompts: Did these sensations make sense to you given the progesterone reading you had? Did you think you could match the readings to sensations in your body, for example if you had twinges.*
- Having that progesterone reading, how did that impact you, not just after you've done the test, but the rest of your day? *Prompts: Did you think about it later or did you forget about it? Did you avoid certain things like exercise, or maybe changed what you ate/drank? Or maybe there was no difference to what you did? Why do you think it influenced you in that way?(or why do you think there was no difference for you?)*

**(Fourth/last progesterone test – spend 10 mins total here):**

- Thinking about your last test now, can you tell me about what it was like for you do this final test and getting that last reading?
- I have your screenshot here and it had..... *Prompts: How did you feel about that? What were you thinking? what do you make of this result?*

- I've got your photo and diary entry here, (*ask them if its ok for me to share the image on Zoom using 'share screen' so we can both look at it together*), can you tell me a bit more about this photo on day (...). *Prompts: what was happening for you here? What were you thinking about when you captured this photo? I noticed....*
- I know in your message to me you said (...), do you want to tell me a bit more about that? (*Generic prompts*)
- Did you notice yourself paying attention to certain physical sensations or symptoms when you got this final progesterone reading?
- How did it feel to finish testing? *Prompt: Relieved? Sad? Hopeful? worried? Prompt: What were your thoughts when you saw the results?*
- Having finished all the tests now, and having that progesterone information, what has it been like waiting to see whether or not you are pregnant?
- *Prompt 1: Some people call this the 'two week wait', where they have to wait until they find out if they are pregnant or not. What has this been like for you?*
- *Prompt 2: Do you think having that progesterone information changed this waiting period for you in this cycle? In what way?*
- *Prompt 3: Do you do anything differently this time waiting - For example, taking a pregnancy test early, or not taking a test when you normally would have.*
- Having that last progesterone reading, how did that impact you, not just after you've done the test, but what about these last few days? *Prompt: did you forget about the results, or did you think of them?*

**Experience Overview Questions (approx. 10 minutes- aim for depth)**

- Thinking about what you've told me about those test days, what really sticks out for you for this cycle?
- If you were going to describe this experience of using this hormone technology overall in just one word, what would that word be? *follow-up question: Tell me why you would've called it that?*
- Can you tell me a bit about what it was like to have to wait for each of those test results to be developed each day? (each day with a bit more information).  
*Prompt: Would you have preferred to have this information daily, or would you rather have had someone (like a dr) at the end of your cycle tell you your progesterone is fine or is low?*
- (relates to above) Proov cycle report card: Did you notice that there's a hormone report for this cycle?  
*Prompt: What did you think of that?*  
If not: You can take a look at it now if you want to? (*talk them through where it is located*). *Prompt: How do you feel about the report?*
- Did anything change for you after doing this study? *For example, I knew someone who started hating going to the bathroom because she associated it with all the testing. Do you think this experience has impacted how you will experience your journey of TTC now going forwards?*
- Did hormone-tracking shape the way you thought about your body at all?  
*Prompt: Sometimes people talk about being able to visualise their bodies in new ways, or that seeing these internal reproductive changes made them feel differently or see themselves differently- was this the case for you? Some people have described a*

*newfound appreciation seeing everything that goes on internally, or the opposite feeling like their body is a failure.*

➤ **Sum up overall experience:**

E.g., It sounds like the experience of using Proov changed for you over time? Or;

So it sounds like things didn't really change over that test period for you, would that be right? *Prompt: Did you want to talk a bit more about that?*

*[Residual questions if time:*

- I know the app doesn't ask for moods the way that menstruation tracking apps do, if it had asked you for moods, what would you have put in?

*Prompt: What's important about..... for you to track?*

- I'm curious to know if you would refer hormone-tracking technology like this to someone else TTC? *Prompt: why*
- Did you learn anything new about yourself and fertility through this study?
- At the beginning of the interview you said that you were hoping the tech would [help you understand your body better (as example)], thinking about what you've told me today, do you think that it did?]

**Interview wrap up at 55 minutes**

- Refer to their individual results: I hope you find reassurance that your levels are normal, or;

(if low level of PdG): I hope you find it helpful gaining a bit more piece to the puzzle and that this could be useful information for you to look into, do you think you will see someone (i.e., doctor) about possible progesterone support?

- Positive note: Acknowledge the overall feeling of the discussion. We have talked about a lot today and I understand how emotional/difficult trying to conceive can be sometimes,
  - so it was nice to hear.....(recall positive moment from interview or how they coped positively e.g., I really liked hearing how supportive your partner was..).

Or:

- I feel like you are doing so well given the circumstances....I think anyone in your situation would...feel the same way...(validation)

and wish them all the best in their TTC journey.

- That concludes the study, is there anything else you would like to add that you feel is relevant or significant to you that we haven't discussed?
- I am going to stop recording.

Stop recording
Now that we have finished, would you like me to talk through some of the support resources that are available?
<ul style="list-style-type: none"> <li>- If appropriate/relevant: refer to information factsheets around progesterone and related support in resources, including next steps of consulting with a medical practitioner if there are concerns.</li> <li>- General chat about their plans for rest of the night/day.</li> </ul>
Remind them of the support services and resources provided if anything does come up.

- Tell them I will reach out in a few days to see how they are and to ask if they wanted to catch up call or meeting regarding the resources.

## Appendix F. Example Diary Entry

### Baseline Test Diary:

Participant: Hi just letting you know I did my first test this morning. I'll send through my reflection this afternoon 😊 Just have some family commitments this morning

*Researcher: Thanks so much for letting me know. When you get a quiet moment later tonight, I thought some prompts might be helpful for your first diary reflection: What were you expecting to see? What were you thinking of, or feeling, while you waited for it to develop? When you saw that result, what was that like to see that number? Relief? Hope? Nervous? Or anything else 😊*

[0.4 graph screenshot sent]

Participant: Today I took my first progesterone test. I woke up feeling excited to take the test and to start the process as this feels like one step closer to a positive pregnancy experience. I had also had a gp appointment earlier in the week with my doctor about my future pregnancy, so it was front of mind when taking the test. Whilst the test was developing, it was interesting in that it showed two lines (which is indicative of a positive pregnancy test) so was a reminder of the many pregnancy tests I have taken. My test result was low which was expected so I feel like it's a good start. I am feeling curious as to how this number will go up over my cycle.

*Researcher: Thanks so much for this great first diary reflection. It is interesting that it showed two lines isn't it, I can see how that would remind you of all the past pregnancy tests. Sounds like things are getting off to a good start for you numbers wise, and you are curious to see how the number will go up over your cycle 😊*

Participant: No worries. Yes definitely. Looking forward to the next test 😊

*Researcher: I'm kinda curious about being reminded of last pregnancy tests, what was that like for you? What kind of feelings came up? The next action for you is to log your ovulation manually in Proov and just give me a quick message so I know roughly when Proov will prompt you to do the PdG testing 😊*

Participant: I would say feelings of optimism and positivity mostly. In some ways, by taking the [Proov] tests, it makes me feel like I have more control over the conception process, but I think it's just the thought of knowing I might have additional information to help a future pregnancy that is making me feel hopeful 😊

*Researcher: That makes a lot of sense, I can see how doing the tests you would feel more in control over the process sounds like you are hopeful and ready to make a go of this cycle 😊*

[Cycle Day 14]: Participant: Hi, I hope you're going well. Just wanted to let you know that I've just logged ovulation in my Proov app 😊

*Researcher: Thank you 😊 hope you are well too. Proov will send you prompts in approximately 7 days to start the PdG testing window (I think it might also remind you the night before) It will be the same process to the baseline process and diary 😊*

Participant: Awesome. Thanks so much 😊 I was wondering when the next test would be.

*Researcher: No worries 😊 It should be 7 days post ovulation and it's in a 4-day window (every day for 4 days) Have a good week and talk to you soon!*

*Researcher: Morning, Just wondering if Proov sent you a prompt to test today? 😊*

Participant: Morning, it's prompting me to do it tomorrow as I noticed my ovulation was stronger the day after I messaged you so I swapped the date 😊 Will do the first test tomorrow  
Looking forward to seeing the results!

*Researcher: No problem at all 😊 talk to you then and have a good day*

Participant: Really hoping for a positive pregnancy result this cycle. Fingers crossed I'm seeing a good increase in progesterone 🙌 Sounds great. Have a nice day today too :)

*Researcher: I have all my fingers and toes crossed for you 😊 🙌 🙌 🙌*

### **First progesterone test diary after ovulation**

Participant: Morning, I took my first test this morning. It detected a rise so it looks like I ovulated this cycle. Yay!

[pic of graph with 5.3 score sent]

Participant: It looked like a small increase to me, which felt somewhat disappointing. I'm not sure why, but I expected it to show a higher number. I usually feel ovulation quite well and had the usual cramps and change in cervical mucus on Day 14, so for some reason was expecting a sharper increase. I've felt a bit on edge this week as I'm in the "two week wait" to find out whether this cycle was successful for conception. I've had a lot of twinging and cramping so it's hard not to read into it, especially with the addition of social media.

*Researcher: Morning thanks so much for these insightful thoughts 😊 It sounds like you had a positive ovulation and you felt ovulation quite well this cycle but seeing this number - it feels low to you and you expected it to be higher. I can understand you feeling on edge for the two week wait, it is nerve wracking! I can see how you would be noticing twinges and cramps and wondering if that's something related - are you thinking implantation type symptoms? And that's interesting about social media too- it sounds like it's kind of at the forefront of your mind right now, would I be right in saying that?*

*Participant: Thanks 😊 You're right. I do feel like it's at the forefront of my mind. I'm finding it hard not to think about it and over analyse symptoms etc as it could also just as likely be premenstrual symptoms too. Cramping and twinging feels like it could be implantation as it's been quite consistent the last couple of days*

*[Another text]: How does the testing progress from here? Is it expected to continue rising?*

*Researcher: That's interesting about the cramping and twinges in the last few days. I can totally understand it would be hard not to think about it, I would be the same. It can vary and if I remember correctly, Proov suggests at least 3 positive PdG results to confirm ovulation - it should give you messages when you get the results. Tomorrow it might give you more insight I also remember listening to a helpful post cast in the app, and they also have links to some social media places Also at the end it provides a report with a bit of feedback about your results and score. Hope that's helpful 😊*

*Participant: Ohh that sounds great. I might have a listen to it 😊*

*Researcher: It's quite American but thought there was a lot of info there 😊*

Participant: Haha yeah some of them can be a bit like that. Thanks for letting me know.

*Researcher: Feel free to share any other thoughts later if you have them or photos too of you feel they are significant otherwise it will be the same process tomorrow 😊 a test and diary entry.*

### **Second progesterone test diary after ovulation**

*Researcher: Hi How did you go this morning?*

Participant: Hi, good! My progesterone is still elevated which is a good sign 😊

[pic of graph with 5.1 level sent]

I still have a fair bit of anxiety I suppose you would call it as to whether I'm pregnant or not. I don't want to get my hopes up. I am really happy to see my progesterone is still elevated. It is only just above that 5 mark, but knowing what I know about having lower progesterone, this makes sense and in a way solidifies what my GP and I suspected.

*Researcher: Thanks so much for these thoughts 😊 I can see how the uncertainty about whether you are pregnant or not is making you feel anxious. What is it about getting your hopes up that worries you do you think? You're happy that progesterone has stayed elevated but at the same time because it's only 5, you feel it is solidified what you and your GP suspected about having low progesterone is that right? And that's because of the 5? Do I have that right?*

*What are your thoughts about a rise? I remember you wondering whether it would rise yesterday*

Participant: Yes that's right. I know that 5 is the lower end of the threshold, but also understand everyone is different, and it's more about whether ovulation took place as opposed to super high numbers. I know progesterone is a huge part of early pregnancy success, and am worried about

another miscarriage happening. It's bringing up some of those feelings for me probably because it's the first month TTC [trying to conceive] after two losses and a longer gap of not TTC.

*Researcher: Oh I really feel for you, it is so hard having two losses in a row. ❤️ I can totally understand how it would bring these thoughts up and knowing progesterone is a huge part of early pregnancy success*

Participant: Thank you. It's hard to stay optimistic sometimes, but still crossing my fingers for a healthy pregnancy soon.

*Researcher: I totally get it, go gently today and tomorrow will be your 3rd PdG test and diary entry. If you have any further thoughts later today feel free to put them here also*

Thanks I will do 😊

### **Third progesterone test diary after ovulation**

[pic of graph with 4.8]

Participant: Hi, my test this morning showed a slight drop today below that 5 threshold. I feel really disappointed with this result, however, I have read online that a lot of women who have used the tests have still been pregnant even when their test shows negative results/their bloodwork showed they ovulated but their urine sample showed otherwise. This is really interesting and has me thinking about how reliable the tests are, or whether they are more helpful as just a general benchmark to catch ovulation. I am going to try to ease my anxiety today but getting outside for a lunchtime walk. I am recognising that the testing is perhaps increasing my stress a little bit as I am worrying about the results and what they mean.

*Researcher: Morning. I can see how that slight drop could feel disappointing, and it would lead you to look online to see what other info you can find. It sounds like something I would do.*

*That's interesting isn't it, that their bloodwork was different to urine, and they still got pregnant.*

*I can see how that would make you wonder how reliable they are. That's a nice idea for a lunchtime walk, I've always found fresh air and nature helps. it's an anxious time already and having these tests sound like they intensify that a bit don't they*

Participant: Yes definitely. I feel like it's a great tool to find out whether ovulation has occurred, but perhaps not as useful for tracking a pregnancy as ultimately it will be a positive pregnancy test or not that is the telling sign 😊

*Researcher: Yes that's true 😊 I've been wondering how it would impact the two week wait and if the info would be helpful or not. I keep wondering how I would have found it, and I think I would have felt the same way*

Participant: Yeah definitely. I think a lot of women would feel similar. I'll be really interested to see what the feedback was like from your other participants later down the line

*Researcher: I think so too. Yeah it will be great to get the findings and I will definitely be sending you a copy of the report 😊*

#### **Fourth and final progesterone test diary after ovulation**

[pic of graph with 7.0]

Participant: Hi, my last test today is showing a rise since yesterday up to 7 😊

I am now 10DPO so I also took a pregnancy test (super early I know!) but I went to bed early last night because I was having waves of nausea. The test was negative which was an expected result this early, but as my plan is to start my progesterone supplement even with a faint positive. I was eager to know.

[neg pregnancy test pic sent] Negative at this time. Will wait a couple more days until I test again 😊

*Researcher: Morning 😊 I had been wondering how you were going and how you were feeling since yesterday. Looks like things are on the up! How did you feel seeing that rise in the graph? What kind of thoughts entered your mind? You felt nausea last night, and this made you decide to take a test this morning would that be right? Curious to know if you took this pregnancy test before this PdG test or afterwards, and how did these results make you feel about everything?*

Participant: Morning, yes I am pleased to see a rise. It was unexpected to be honest, but now it has me thinking could this be an early pregnancy starting. I'm trying not to read too much into it, but as I understand it would typically start dropping as you near your period? Yes that's right, I've had a few symptoms like cramping, little bit of nausea and just feeling tired. They could be PMS, but last night the nausea felt quite sudden and strong which is unusual for me. Yes that's right, I've had a few symptoms like cramping, little bit of nausea and just feeling tired. They could be PMS, but last night the nausea felt quite sudden and strong which is unusual for me. I actually took the two tests at the same time. I left the bathroom and waited 10 mins to see the results of both at the same time 😊 I noticed the line of the PDG was really faint/hardly visible compared to yesterday so I thought that might indicate a little rise when I took the photo

*Researcher: It seems like a good sign doesn't it at this stage in cycle, I can see how a rise at this stage would make you think a pregnancy could be starting. At the same time it sounds like you don't want to read onto it just yet. Ok so quite a few symptoms, and some unusual ones for you which also gave you a feeling there could be pregnancy too. That makes sense to take them both at the same time and sounds like you noticed a change in line straight away*

Participant: Yeah definitely. I would agree. As a way to protect my feelings I'm just going to try to remember what will be will be and I can't change the outcome of this cycle 😊

*Researcher: I totally understand that, it's hard not knowing exactly what the outcome will be and sitting in that uncertainty. Well that was your final PdG test. Our last thing to do is an interview about your experience of progesterone testing. I will let you have a think about when would suit you best to do this. I'm free over the weekend and also early next week.*

[arranged time for interview]

## Appendix G. Ethics Approval



13/05/2025

Dear: Isabel Huyser Pearson

**Re: Ethics Application - OM1 25/08 - Exploring women's use of fertility hormone tracking apps while trying to conceive.**

Thank you for the above application that was considered by the Massey University Human Ethics Committee:

**Ohu Matatika 1** at their meeting held on **Tuesday, 11 March 2025**

On behalf of the Committee I am pleased to advise you that the ethics of your application are approved.

Approval is for three years. If this project has not been completed within three years from the date of this letter, reapproval must be requested.

If the nature, content, location, procedures or personnel of your approved application change, please advise the Secretary of the Committee.

Yours sincerely

Professor Tracy Riley,  
Acting Chair, Research Ethics Chair's Committee