From Menstruation to *Mens Rea*:

How AI-mediated reproductive data becomes entangled with carceral systems

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December 2025

Abstract

Law enforcement seizure of devices, to repurpose data from cycle-tracking applications (CTAs) as evidence of *mens rea* (criminal intent) in abortion prosecutions, poses serious epistemic and ethical challenges. As large-scale data infrastructures and AI-driven platforms increasingly claim to predict and operationalise user intent, they risk reducing complex, situated motivations and embodied reproductive knowledge into data streams stripped of social and experiential context – privileging algorithmic outputs over a woman's interpretive authority. Drawing on Chaudhary & Penn's (2024) critique of the emerging "intention economy," and using the UK case of Rex v Packer as a focal point, I consider how we might study the dangers of inferred intent through the lens of reproductive surveillance, where CTAs collect intimate data, embedding algorithmic assumptions about users' reproductive goals and law enforcement repackages it as evidence. I critically evaluate the methodologies of feature review, infrastructural tracing, and participatory methods to determine their suitability for exploring how AI-mediated reproductive data becomes entangled with carceral systems. I conclude that each method highlights distinct sites where intent is constructed, circulated, and contested, and that to study these dynamics, a pluralistic methodological framework is necessary which permits us to examine the entire system – from design patterns that encode normative assumptions and backend architectures that monetise intention, to community-led practices that prioritise resistance against reproductive surveillance. I propose a mixed methods approach combining critical systematic functionality reviews, infrastructural tracing, and participatory threat modelling, in order to advance holistic study of systems that transform intimate, inner life beyond a tradable commodity and into a source of forensic evidence.

From Menstruation to *Mens Rea*:

Methodologies for Studying Datafied Reproductive Intent

In November 2020, Nicola Packer was arrested in the United Kingdom after seeking hospital treatment for complications arising from prescribed home abortion care, provided under pandemic health protocols (Al-Othman & Boyd, 2025). Police seized her mobile phone, examined app data, messages, and photographs for evidence of unlawful abortion, and charged her with "with intent to procure a miscarriage" (Al-Othman, 2025). Although eventually acquitted, Packer described the ordeal as "traumatic," highlighting the invasive scrutiny of her most private information in open court (Booth & Robinson, 2025).

In criminal law, *mens rea* refers to the mental element of an offence, the knowledge and intention regarding the actions under consideration, which must be established alongside the act itself (*actus reus*) for liability to arise (McGuinness, 2024). Traditionally, in cases like Packer's, criminal intent has been difficult to determine without a direct confession, and written accounts such as personal diaries would not be admissible in court (Conti-Cook, 2020). However, this case exemplifies an emerging evidentiary turn: reproductive app data, once collected for health and self-care, is repurposed as evidence of criminal intent (Block, 2025).

In this paper, I argue that existing scholarship on app affordances - represented by Hasinoff & Bivens' (2021) feature analysis, Flensburg & Lai's (2023) infrastructural tracing, and Slupska et al.'s (2022) participatory methods - when taken individually, are insufficient to study the capture, repurposing and criminalisation of intent. To that end, I critically assess these three approaches, highlighting what each method would reveal, and would miss, if applied to cycle tracking apps (CTAs). In Section I, I discuss how CTA data is being used to support prosecution through determination of intent to end a pregnancy. Section II considers how the collection of intimate data at the interface is normalised, and how the methodology

of feature review might reveal coercive patterns in CTAs. Section III looks at infrastructural tracing as a way to understand where data moves beyond the frontend, becoming a decontextualised site of inferred reproductive intent. Section IV introduces participatory methods as a means of disclosing potential threats to users, highlighting how the foregrounding of lived experience is a necessary complement to other analysis. Section V brings these methods into dialogue, and I propose a layered framework comprising both micro- and macro analysis of intent extraction, along with purposeful participatory methods, to examine systemically and across scales, the end-to-end production and refusal of evidentiary reproductive intent.

I. Reproductive intent and the evidentiary turn

Cycle tracking apps normalise intimate disclosure and embed predictive algorithms which transform complex inner lives into tradable commodities. Marketed as tools for pregnancy planning or prevention, these apps present design ideologies of empowerment through self-knowledge (Felsberger, 2025). Users are encouraged to monitor bodily patterns and record highly personal details: menstruation dates, flow volume, cervical mucus consistency, pain, mood, sexual desire and activity, contraception and medication. Machine learning translates these data into predictions about ovulation, fertility windows, menstrual timing, and pregnancy status, which are used to serve social content, products and recommendations based on the user's inferred intentions (Riley et al., 2025).

This dynamic recalls what Chaudhary & Penn (2024) describe as the rise of an "intention economy," where digital signals of motivation are captured and commodified. In the case of CTAs, what is being monetised is access to the lucrative pregnancy care market, valued at $33 billion in 2024 (Precedence Research, 2024). Deriving intent in this way can be problematic, as the practice relies on reductive assumptions that fail to reflect the complexity and diversity of reproductive experiences. Despite widespread adoption, with over 50% of women in the United Kingdom using CTAs (Milivojevic, 2025), these apps attempt to categorise user intent through broad initial prompts ("get to know your body" or

"become pregnant") and questions about cycle irregularities and moods. Reproductive intention algorithms use this information to slot users into consumer segments that are highly valuable for profiling – more than fifty times more valuable than credit card data (Felsberger, 2025, p. 22).

As Chaudhary and Penn (2024) warn, the algorithms that profile users' intentions rest on uncertain scientific foundations, creating a risk of miscategorisation. Such input cannot capture the multifaceted nature of reproductive intent, which may shift over time or exist in states of ambiguity that defy neat categorisation. Flo, for example, is designed with conception in mind, enthusiastically prompting users to take a pregnancy test after a single day delayed period (Broad et al., 2022). Other apps require users who report a pregnancy to enter a termination date and details before continuing to use the app for period tracking (Privacy International, 2025).

The conversion of bodily experiences into machine-readable data for marketing purposes is certainly a site of AI-enabled harm. However, the evidentiary use of CTA data risks weaponising the quantified self with far greater consequences. While poorly categorised intentions might merely subject users to unwanted or misaligned commercial overtures in the intention economy, the stakes become much higher when these data are repurposed in investigatory or institutional contexts, reframing the quantified body from a site of care (or even commodification) into a target of suspicion.

This transformation is operationalised in the UK, where police guidance authorises examination of devices when unlawful abortion is suspected, as seen in the Packer case (College of Policing, 2021). In England and Wales, over 60 investigations related to abortion occurred between 2018 and 2024, compared to only three reported cases between 1967 and 2002, largely correlated with growing maturity in digital forensic investigation (BPAS, 2012; Oppenheim & Patrick, 2024). What began as a private act of self-monitoring, using the digital descendants of pen-and-paper diaries, now carries the risk of self-incrimination.

Cycle-tracking apps have not yet served as the sole basis for conviction, but pathways for weaponising their data are firmly in place. Dellinger and Pell (2024) outline

scenarios where investigators combine menstrual logs, pregnancy-test photos, and browsing histories to construct probable cause under personhood statutes. These hypotheticals reveal how timestamped entries and algorithmic predictions of pregnancy status or termination can be synthesised with other surveillance tools such as medical records, call logs – even doorbell footage – to impute intention.

When algorithmically generated inferences are treated as authoritative, they risk displacing the user's own account of their body. Miranda Fricker defines testimonial injustice as occurring when a speaker's credibility is unfairly undermined due to prejudice on the part of the hearer (Fricker, 2007). The datafication of reproductive intent introduces significant risk of such injustice, embedding assumptions that easily misrepresent the complexity of lived experience. Each body is different: for many, a single day (or even a 90-day) delay in menstruation does not reliably indicate pregnancy, and the enforced datafication of a suspected pregnancy does not confirm its reality or viability. Yet when algorithmically generated data fields are rendered legible during forensic analysis, they acquire an epistemic authority that risks displacing embodied knowledge in ways that go beyond a pen-and-paper period diary (ICO, 2020; Conti-Cook, 2020).

The Packer case exemplifies this testimonial injustice. The central question at trial became how far the pregnancy had progressed when it was terminated, in the absence of hospital scans due to pandemic restrictions. Packer believed she was only around six weeks pregnant (Al-Othman & Boyd, 2025), yet legal determination hinged on contradictory digital evidence rather than her own understanding of her body. Faced with data that prosecutors claimed indicated a more advanced pregnancy, Packer was forced to show intimate photographs to the jury to demonstrate that she "didn't look pregnant" (Booth & Robinson, 2025). Her embodied knowledge (endometriosis, body shape, reproductive intent, experience of her own pregnancy) was rendered less authoritative than the supposedly objective authority of data. The case demonstrates how lived experience can be undermined when decontextualised digital artefacts are privileged over the interpretive authority of the person in question.

The inference of intent through CTAs can lead to punitive consequences when combined with carceral logics, raising new methodological questions: how should scholars study sociotechnical systems that mediate such harms? What approaches can reveal relationships between design, infrastructure, lived experience and datafied intention? Existing research tends to address these dimensions in isolation, examining privacy law and security (Malki et al, 2024; Citron, 2023; Ehimuan et al., 2024), interface design (Bivens & Hasinoff, 2018; Hasinoff & Bivens, 2021) and lived experience (Conti-Cook, 2020), with little evidence of integrated frameworks encompassing these aspects simultaneously. Integration is key, because CTAs are part of a much wider ecosystem moulding intimate bodily details into political and forensic artefacts, incorporating cloud servers, ideological and venture capital incentives, and policing practices. To holistically address this multi-faceted problem space, researchers need theoretical and methodological integration that can hold scales of complexity in view simultaneously.

Actor-network theory (ANT) offers an approach to analysing complex sociotechnical systems, as it considers distributed networks of human and non-human actors whose interactions all play a role in producing outcomes (Latour, 2005). Although a full discussion of ANT is beyond the scope of this paper, it is worth a mention because the theory informs methods for tracing patterns across app interfaces, algorithms, legal instruments and forensic tools. Awareness of systemic relationships of people, process and machines could create richer understanding of interconnections. To build toward such methodological pluralism, the following sections assess three distinct approaches in turn, evaluating what each reveals about inferred reproductive intent and what it tends to obscure. I will first examine two methodologies grounded in ANT, which analyse both micro-level design ideologies and macro-level infrastructural flows, beginning with the interface, which is the point where intimate datafication begins, and where design choices codify assumptions about bodies and reproductive intent.

**II. Analysing the interface as mediator of reproductive intent**

Cycle-tracking apps mediate the transformation of embodied experience into data at the interface, the point where intimate knowledge first becomes machine-legible. It is here that design choices not only invite disclosure but also codify assumptions about reproductive norms and user intent. In the Packer case, prosecutors relied on digital traces produced upstream of forensic analysis: app entries, timestamps, and algorithmic predictions that were treated as evidence of how far the pregnancy had progressed and, by implication, of Packer's intent. Understanding how such traces are generated requires close attention to interface design as a sociotechnical mediator.

Within Human-Computer Interaction (HCI), a range of methods exist for examining interfaces, from user research to design analysis. The walkthrough method (Light et al., 2018) is particularly effective for exposing the cultural assumptions embedded in app flows through detailed examination of interactions to make visible the underlying design choices. The detailed nature of walkthroughs make them well suited to critical inquiry, but their depth comes at the cost of scalability. Given the size and heterogeneity of the cycle-tracking app ecosystem, methods that can identify patterns across multiple apps are necessary to understand how inferred reproductive intent becomes normalised at scale.

To address the challenge of analysing a large and diverse ecosystem of CTAs, functionality- and feature-oriented methods offer useful approaches. Functionality reviews, formalised by Hossain et al. (2025), systematically examine multiple apps to check whether features comply with established design patterns. Feature analysis, introduced by Hasinoff and Bivens (2021), goes further by focusing on the cultural and societal assumptions embedded in design rather than just usability. While feature analysis is usefully grounded in affordance theory and feminist HCI, its methods are less standardised, making it harder to apply consistently. For this reason, I turn to feature reviews – a subset of functionality reviews that provides a practical balance between breadth (covering many apps) and depth (allowing critical examination of design choices).

Figure 1

Feature review typology with applicability of methodological approaches. Adapted from

Hossain et al. (2025).
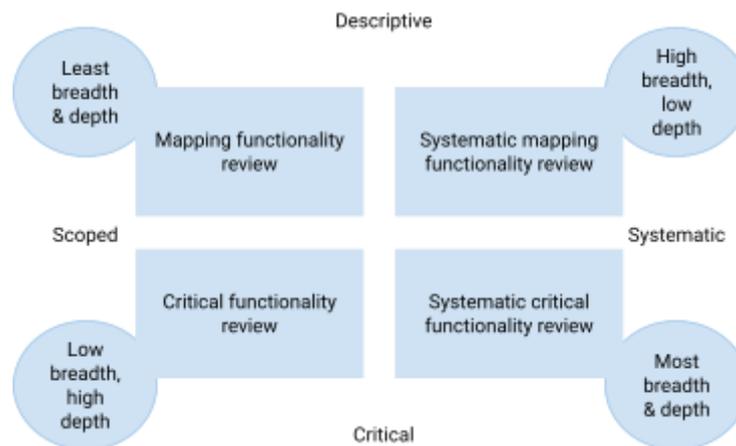
Note. Four methodological approaches are depicted as quadrants arranged to indicate the relative depth and breadth of their analysis.

Hossain et al. (2025) distinguish four types of feature review along two axes: descriptive versus critical analysis, and scoped versus systematic search. Due to their combination of depth and breadth, *critical systematic functionality reviews* offer the strongest methodological footing for analysing how CTAs encode and infer reproductive intent. By combining exhaustive sampling with evaluative critique, this approach enables researchers to identify ecosystem-wide design patterns across both mainstream and niche apps, while assessing their social and ethical consequences.

A critical systematic feature review of CTAs would consider the full range of available CTAs, and rather than simply describing functionality, it would apply a critical lens to various features. This could uncover patterns like coercive or extractive onboarding flows, heteronormative assumptions in goal-setting ("Supercharge your sex lives" with cisgender imagery), and prompts that normalise intimate disclosure through friendly calls-to-action and

gamified engagement (see Figure 2). In Packer's case, where devices were seized, and logged symptoms became retrospectively utilised to infer knowledge or planning, a critical systemic feature review would reveal the design ideologies that privilege prediction, legibility and market segmentation over the unpredictable lived experience of menstruating bodies.

Figure 2

Three screens from the Flo app taken from the onboarding and cycle tracking journeys.
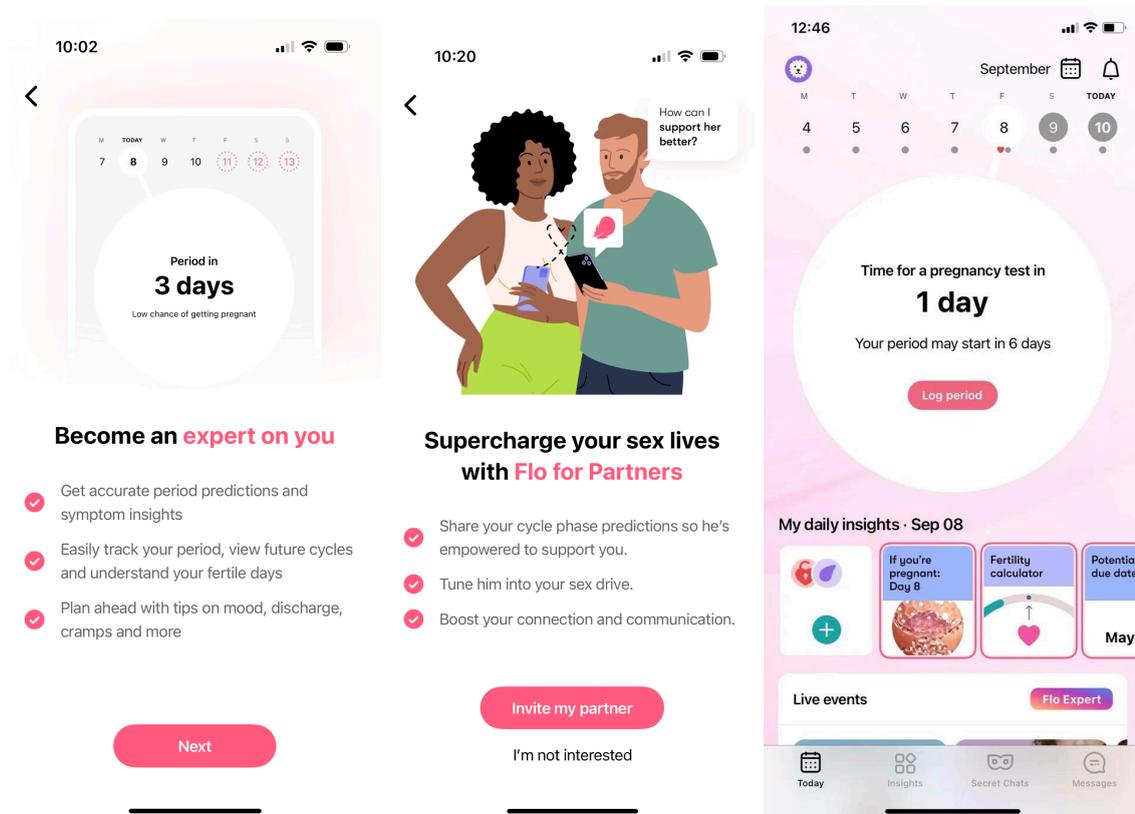
Note. The Flo app promotes datafication as self-knowledge (image 1), backed by heteronormative (image 2) and pregnancy-focused (image 3) design ideologies. Flo Health. (2025). Screenshots of cycle tracking interface [Screenshot]. Flo App. Personal screenshots.

However, even critical systematic feature reviews have limits. Because feature design is subjective, researchers must consider when applying criticism that what may appear as coercive datafication in one context, may be welcome functionality for some

users. And while feature reviews identify dominant interface patterns and their normative assumptions, they cannot fully account for what happens to data once it leaves the interface, nor how users interpret, resist, or misunderstand the evidentiary risks embedded in everyday app use. In the Packer case, critical harms arose from both device-level data and also from how those interface-generated assumptions were later decontextualised by investigators. This creates the need to pair interface analysis with methods capable of tracing data beyond the device, and it is for this reason that I will now examine a methodology for tracing those data flows.

III. Infrastructural tracing: beyond the device

Feature reviews can show us on a micro-level how CTAs codify normative assumptions and entice datafication. Yet understanding the intention ecosystem means also looking at the layers beyond the interface to see what happens to data once it is collected. For this, the infrastructural tracing methodology offers a critical lens. Building on traditions in political economy, critical data studies, and infrastructure research, this approach shifts the focus from visible frontends to the servers and networks deeper down the stack. By tracing these infrastructural layers, the method responds to the limitations of feature reviews and exposes how technical architectures and corporate dependencies shape power relations in digital ecosystems.

Flensburg and Lai (2023) define infrastructural tracing as a method for mapping how data travels through complex digital ecosystems. Their "follow the data" approach tracks flows across multiple layers including networks, backbone systems, and third-party services, bringing visibility to oft-hidden backend processes. This technique reveals the business relationships linking app developers, cloud providers, analytics platforms, and advertisers, with the goal of showing how control over data translates into economic and social power. In practice, infrastructural tracing involves systematically documenting the technical pathways from initial data collection to its various destinations. This can include examining software

development kits (SDKs), application programming interfaces (APIs), cloud storage systems,

content delivery networks (CDNs), analytics tools, and third-party data brokers (see Figure

3). Researchers may also analyse network traffic, review privacy policies and data

processing agreements, inspect app permissions and code libraries, and trace corporate

ownership structures.

Figure 3

Data flow of user information in female mHealth apps, adapted from Malki et al. (2024).
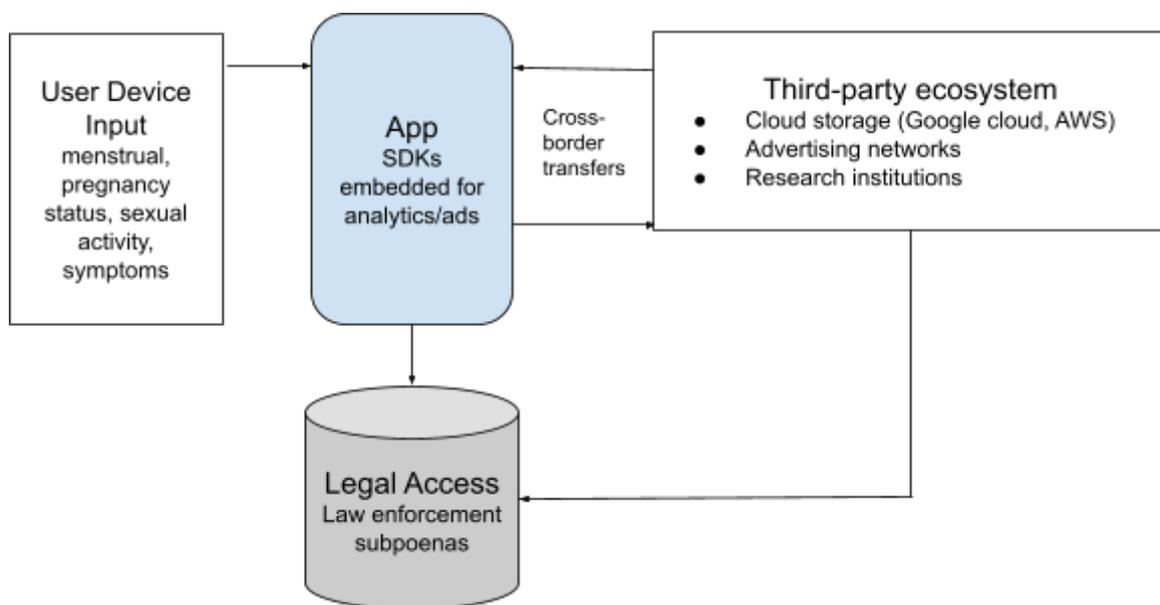
Note. This diagram illustrates how sensitive reproductive health data moves from user devices

through apps to third-party ecosystems and legal access points, highlighting cross-border transfers

and embedded SDKs for analytics and advertising.

For CTAs specifically, this would mean identifying which third parties receive what

categories of intimate data, under what conditions, through which technical mechanisms,

and for what purposes. Importantly for the Packer case, this method, with its breakdown of

relationships between data providers and brokers, would show us how intimate data does

not remain with the user at the app interface but actually travels through systems of hosting,

profiling, and monetisation. It would also show us instances where the CTA developer has stated that user data is private, only for it to be discovered not to be the case. For example, in the United States, the Federal Trade Commission found that the Flo app, despite marketing itself as a private space for intimate health tracking, had been sharing reproductive data with third-party analytics and advertising platforms including Google and Facebook (FTC, 2021).

Infrastructural tracing might be extended to include the ethnographic dimensions that Star & Bowker (1998, 1999) brought to infrastructure studies. Their work extends actor-network theory by weaving in feminist epistemologies such as Haraway's (1988) situated knowledge and critiques of master narratives. Their approach reframes infrastructures as more than technical artefacts, highlighting social arrangements, invisible labour and the relational practices that sustain it. Unlike infrastructural tracing, which focuses on system mapping, their ethnographic inquiry into how infrastructures are experienced in everyday life, offers a lens that complements feature analysis and technical tracing by situating them within broader social worlds.

The relationality of lived infrastructure can be further revealed with a methodology which centres the experience of the user, especially the possibility for agency, resistance and refusal of inferred reproductive intention. Community-based participatory research (CBPR) methods deeply consider lived experience, which I will examine in the next section.

IV. Participatory methodologies: centring lived experience

Community-based participatory research methods are qualitative studies which invite collaboration and research partnership between academic and non-academic stakeholders (Leavy, 2017). These problem-driven methods are designed to be responsive and flexible, and while they may not be conducive to scale (due to their detailed focus on individual stories), they are useful for research questions intended to stimulate social and community change.

The CBPR method of participatory action research has its roots in the quantitative method of community-based surveys, and has evolved into a broader practice of user and community participation (Leavy, 2017). Of these evolutions, participatory threat modelling, developed by Slupska et al. (2022), offers a methodology for researchers to focus on the lived experience of those most vulnerable to surveillance, inviting them to build their own strategies for navigating, resisting, and refusing data extraction. Participatory threat modelling reimagines security analysis as community-led inquiry, positioning those most affected by surveillance as primary experts on their own risks. The method emerges from the security research practice of threat modelling and transforms it from a top-down, expert-led practice into collaborative knowledge production.

Slupska and colleagues developed participatory threat modelling through work with survivors of intimate partner violence, recognising that traditional security advice, such as strong passwords, device encryption and two-factor authentication, failed to address survivors' actual threats. Abusive partners often had legitimate physical access to devices and there was social pressure to share passwords, along with other types of coercion. The researchers held workshops with survivors which revealed that expert-led threat modelling quite often missed vulnerabilities that survivors knew first hand, and gave space for discussion of resistance practices that survivors had developed out of necessity (Slupska et al., 2022).

The method involves bringing together people with shared vulnerabilities to co-create realistic threat scenarios grounded in actual experience, and document how participants already protect themselves. The group translates these learnings into policy recommendations and design interventions. Applied to CTAs, it would give voice to real experiences of evidentiary data collection. For instance, communities have already identified real-world threats, such as intimate partners using cycle data for manipulation, employers inferring pregnancy status from health app usage patterns, and immigration authorities using reproductive health data in deportation proceedings (Felsberger, 2025). In response,

concerned former users of CTAs describe preemptively deleting apps despite preferring the convenience of digital tracking.

Building on participatory approaches, these practices could be formalised through community-led workshops that map data trails and identify vulnerabilities, resulting in guidelines and playbooks that empower users (Our Data Bodies, 2018). Such methods can uncover additional risks, from coerced device unlocking to exposure via shared family phone plans or hospital staff accessing phones during treatment and noticing cycle data suggesting abortion (Milmo, 2023). Mitigation strategies might draw on collective defence tactics, including phone-sharing to obscure individual patterns, local support groups for device management and secure data deletion, and informal networks for sharing trusted app recommendations.

Participatory threat modelling's primary strength lies in addressing testimonial injustice. By treating women's experiential knowledge as authoritative rather than merely subjective or anecdotal, the method challenges the epistemic hierarchies embedded in technical research.The Packer case offers a glimpse of testimonial data that participatory methods would centre as authoritative knowledge. Packer described not understanding that voluntarily unlocking her phone for police gave them access to everything on the device. She felt profoundly violated not only by the investigation itself but by how her intimate data was discussed in open court. Following the dropped charges, she developed what she described as paranoia about technology, avoiding digital health tools entirely and feeling surveilled even in spaces that should have been private (Al-Othman & Boyd, 2025; Booth & Robinson, 2025).

However, participatory threat modelling faces significant constraints and limitations. The method is resource-intensive, requiring sustained engagement, skilled facilitation to navigate potentially emotional discussions, fair compensation, childcare, and sometimes trauma-informed care – making it substantially more costly and time-consuming than

desk-based analysis (Reynolds, 2023). It also risks overburdening or retraumatising vulnerable communities with the labour of their own protection. While participatory methods appropriately centre community knowledge, care ethics suggest responsibility for systemic change should not rest solely on those most harmed (Tronto, 1993), researchers must translate community knowledge into structural intervention. Power asymmetries must also be considered, as researchers frame questions, analyse data, and advance careers while participants rarely gain equivalent benefit. True co-design would involve communities shaping research questions, methods, and dissemination (Peters et al., 2018). Representation is another challenge, as workshops often privilege educated, English-speaking, tech-literate participants, excluding immigrants, low-literacy populations, and those with different cultural understandings of privacy. Without careful attention to power, language, and context, participatory methods risk reproducing the very marginalisation they seek to resist.

Despite these limitations, participatory threat modelling offers an essential methodological orientation for research claiming commitments to social justice. It insists that any adequate understanding of reproductive surveillance must be accountable to those whose lives are most affected and must recognise resistance as a vital form of knowledge. When integrated with feature analysis and infrastructural tracing, participatory methods complete a multi-scalar framework capable of addressing design ideologies, systemic power flows, and embodied experience simultaneously. It is to this integration that the final section turns.

V. Towards a pluralist framework for the study of reproductive surveillance

To study the construction and repurposing of datafied reproductive intent, I propose combining the critical systematic functionality reviews, infrastructural tracing, and participatory threat modelling into a three-layered methodological framework. This mixed method approach addresses distinct sites where intent is produced, circulated, and

contested and situates intent as an actor in a complex network, shaped by design logics, infrastructural commodification, and epistemic hierarchies that privilege algorithmic outputs over embodied knowledge.

Table 1

Three-Layered Methodological Framework for Studying Cycle-Tracking Apps as Evidentiary Infrastructures

Layer	Analytical Focus	Key Questions	Methodological Approach	Relation to Intent
Interface Design	How apps encode normative assumptions and induce disclosure	What design patterns normalise intimate data entry? How do predictive features infer reproductive goals?	Critical systematic functionality reviews (coercive data input flows)	Converts embodied experience into machine-readable signals of intent
Infrastructural Flows	How data moves beyond the device into surveillance and monetisation networks	Where does CTA data travel? Which actors shape its repurposing?	Infrastructural Tracing (APIs, SDKs, data-sharing agreements)	Transforms inferred intent into decontextualised forensic artefacts
Lived Experience	How users navigate, resist, or contest datafication and evidentiary risk	How do people understand and respond to the possibility of their data being weaponised?	Participatory Threat modelling (community workshops, resistance practices)	Reveals epistemic injustice when lived accounts are displaced by algorithmic proxies

A layered framework affords a holistic analysis of the socio-technical pipeline through which intimate data moves from care to commodified intent to evidence. At the interface, critical functionality reviews reveal how design choices, such as predictive algorithms and coercive prompts, normalise disclosure and translate embodied experience into machine-readable signals of intent. Infrastructural tracing follows the data beyond the device, uncovering technical and economic networks that transform intimate data into monetised assets and, ultimately, forensic artefacts. Finally, participatory threat modelling foregrounds lived experience, surfacing how users perceive and resist evidentiary risk, and challenging hierarchies that privilege algorithmic outputs over embodied knowledge.

However, such breadth comes with theoretical and practical constraints. Operationalising this framework requires confronting tensions between the theories of knowledge and causation they each represent. Feature reviews approach design choices as visible ideologies that researchers can evidence with screenshots, feature lists and design patterns. Infrastructural tracing is more focused on the relationship between actors in a networked system, theorising that power is not in a single element (such as interface design), but rather across the system as a whole. Participatory research sidesteps technical analysis altogether and actively works to place power in the hands of the users. Practically speaking, critical functionality reviews demand intensive desk-based analysis, infrastructure tracing may require privileged system access, and participatory threat modelling requires sustained engagement, fair compensation, and trauma-informed facilitation.These resource and time commitments, coupled with the need for ethical care in research practices, pose a challenge in operationalising a truly pluralist approach. Yet, despite these limitations, the framework remains a worthwhile way to capture the complexity of reproductive surveillance and ensure accountability to those most affected.

VI. Conclusion

In this paper, I have argued that the central threat posed by AI-mediated cycle-tracking apps is not the collection of intimate data alone, but rather the production of inferred reproductive intent. This intent can be operationalised for its primary purpose as a commodity, or repurposed as an evidentiary object. Through the Packer case, we see how traces generated at the interface, originally intended for self-care or even commercial profiling, are later decontextualised and reinterpreted within carceral systems as proxies for mens rea. What is at stake goes beyond privacy, threatening epistemic authority: whose account of intention is treated as credible when algorithmic inferences enter legal decision-making.

By critically evaluating feature reviews, infrastructural tracing, and participatory threat modelling, I have shown that each methodology highlights a distinct stage in the construction of intent. Interface-focused methods reveal how design patterns normalise disclosure and collapse bodily uncertainty into machine-readable data. Infrastructural tracing exposes how those data travel through technical and economic networks, where they are monetised, standardised, and segmented. Participatory approaches, by contrast, centre lived experience and resistance, making visible the forms of epistemic injustice created when embodied knowledge is replaced by datafied bodies.

The proposed three-layer methodological framework responds to the limitations of single-method approaches by treating commodified intent as a product of many human and non-human actors across scales. Applied to reproductive surveillance, this shows the many processes involved in creating inferred intent, and the potential legal intervention points at the front and backends of apps marketed as personal bodily empowerment. It can lead to identification of points of systemic intervention including new design standards that reduce evidentiary risk, infrastructural accountability for data flows, and community-led practices that contest the authority of inferred intent.

While grounded in the context of cycle-tracking apps, this framework could also apply beyond reproductive health technologies. As AI systems increasingly infer motivation or predict behaviour in domains such as benefits administration, immigration control, and predictive policing, the methodological challenges identified here become applicable. Studying these systems requires approaches capable of understanding how intent is constructed, circulated, and repurposed across scales.

Returning to the Packer case, it becomes clear that a multi-scalar methodology could be a pathway to meaningful study of reproductive surveillance and inferred reproductive intention. Specifically, critical systemic feature reviews would reveal the coercive design patterns that left Packer vulnerable to device seizure, the data flows that would transform her app inputs into market segments and intention, and participatory threat modelling would allow her to gain agency in the datafication of her own body. Together, these methods move us toward systemic understandings that challenge the intention logics embedded in intimate data technologies. Ultimately, a combined approach can help support those most vulnerable to prosecution, ensuring they may continue to experience the benefits of digital health tracking, whilst also being informed, protected, and equipped to navigate the risks of using cycle-tracking apps.

Future research should test this framework's applicability beyond reproductive surveillance to other domains where intimate data becomes evidentiary, including mental health apps, substance use monitoring, and predictive welfare systems. This work should move beyond analysis towards intervention, translating participatory insights into design standards, policy reforms, and community-led defence strategies that reduce harm for those most vulnerable to the weaponisation of intimate intent across multiple sites of digital surveillance.

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