Beyond the Pink App: A Deeper Look at Fem Tech

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Through technological innovation, FemTech promises to address the long-standing neglect of women's health needs. However, a critical question remains: to what extent do mainstream FemTech developers effectively incorporate the specific needs of their users into product design? This study aims to partially address this gap by examining two FemTech offerings through the lens of design justice principles. We found that while some aspects align with user-centered design, others exhibit discriminatory omissions and biases. By highlighting the limitations of current FemTech design practices, we hope to stimulate further research and development that prioritizes user-centered, inclusive, and equitable approaches.

Keywords: HCI, User-Centricity, Mobile Applications, Fem Tech, NLP, Topic Modelling, Toxicity

1. Introduction- Empirical Motivation

FemTech refers to software, diagnostics, products and services, that use technology to support women's health. (FemTechinsider). This sector of FemTech is proclaimed to be associated with the lived experience of Females, particularly around healthcare. This includes a wide range of digital and physical products ranging from breast-pumps to wearables to mobile and web-based applications for tracking and monitoring reproductive health to online engagement and community channels to empower females. Justification for the need for the focus on need of the females as separate user category in technology products stems from contexts to address the prevalent gender-bias in various fields, underrepresentation of women's healthcare needs and the long-standing stigma around reproductive issues.(Punzi MC, 2024).The researchers have covered a wide range of important topics related to women's health, including motherhood, breastfeeding, menopause, pelvic fitness, menstruation, and abortion (Campo et al., 2020; Chopra et al., 2021; D'Ignazio et al., 2016), and field has been instrumental in advancing our understanding of these topics and developing new technologies to improve women's health. Technology scholars have also investigated the clinical conditions like cervical cancer and its screening(An, Jong Min, et al, 2024) With the advancement in technology and availability of products the issues such as privacy, security and inclusion of variety of female needs also interested researchers., This has become more relevant with the IoT devices designed for female health, integration of IoT with mobile devices providing an ecosystem around health tracking and management to female. we came across articles on issues such as unencrypted Bluetooth traffic and insecure connections between devices and mobile apps (Cook, 2024) Critical IS scholars have raised concerns about surveillance and the shifting of health management responsibilities onto individuals (Mishra, P., & Suresh, Y. 2021).

A prominent sector in FemTech is mobile phone applications – mobile apps. In this domain, research largely has been centered on women's reproductive health, particularly fertility (Fowler et al., 2023). These studies highlight the growing significance of FemTech products - mobile apps in users' lives, showcasing their potential to bridge gaps in access by supporting reproductive decision-making and health management (Fowler et al., 2023). researchers find that while catering to many needs of female these mobile applications also suffer from exclusionary effects, reinforcement of gendered social hierarchies, and concerns over privacy and data commercialization exist due to datafication of the reproductive bodies in india (FemTech apps and quantification of the reproductive body in India: Issues and concerns). Studies also have been on the regulatory landscape of these FemTech mobile apps (McMillian, 2022) There is also a growing interest among scholars in the fields of business strategy and information science to use interactions on social media for understanding perception of developers and users by doing discourse analysis (Pullen and Vachhani,2019; Ustek-Spilda et al., 2021).

Previous literature also highlights the move towards user-centric design in FemTech app development. Mishra et al. (2023) emphasizes the need to consider how app design influences users' understanding of their bodies, particularly in the context of menstrual health. Their study underscores the need for designers to be mindful of power dynamics and to avoid reinforcing normative ideals. (Alfawzan and Christen et.al, 2023) shed light on user experiences and preferences, emphasizing the importance of addressing concerns related to data privacy, prediction accuracy, and cost. By incorporating user feedback and insights, designers can create FemTech apps that are more empowering, inclusive, and effective in meeting the diverse needs of women. In our paper, we aim to contribute in this research direction as we investigate user experience via user reviews and the responses they received from the application developers. We situate this study within the wider framework of Design Justice (Costanza-Chock, 2020). This framework centres marginalised communities and recommended ways to address the systemic inequalities by proposing to investigate design practices and re-imaging the possibilities. One core principle often highlighted in book that is relevant to our study is user-centricity. Design justice emphasises on understanding and addressing the diverse

needs and capabilities of all users. User-centric design that traditionally, is often focused on a narrow demographic requires a more inclusive perspective with a wider understanding of human capabilities and social contexts (Vannini S, et al, 2024) (Tandon A, 2020). Innovation is shown to benefit by knowledge and insights from users and their localized context. It is crucial to recognise the variance in user needs and actively include them in the design process in order to create more responsive products and services. In our paper, we aim to bring a new perception to discuss user experience and their response to FemTech mobile applications with user reviews in app store as a proxy. We also look at attention to "what" is given by developers which is less researched topics in IS and allied disciplines. We address this gap partially as our research questions are "How female user perceives and share their experiences around the features available on mobile application to manage reproductive and sexual wellbeing? What all expressions of user needs receive attention of developers?

2. Methodology

This study, focuses on the user reacting and experience recorded first-hand to FemTech app developers. There are numerous sources to control for user experience like online forum discussions on platforms like twitter, reddit and Quora (Mishra et.al., 2023). There are few studies that use user reviews in application distributers (digital distribution service providers) as a proxy for their reaction. Another prominent reason for using this as a source is this enabled us to look at the developer's response as usually, developers reply to the review content directly.

Majorly, there are two types of applications, one for android mobiles and the other for iOS mobiles. In 2024, around 70% of market share is being dominated by android phones. Therefore, for the scope of this research, we collected data from The Google Play Store that hosts around 3,55 million mobile applications available for download to its users. In order to narrow down the apps relevant to this study, we used keywords like "menstrual tracking", "female health", "pregnancy tracking" and "reproductive tracking" to filter the mobile applications. We found a total of 11 apps from the google play store that matched with the given keywords. Further, we narrowed our selection to 2 apps after filtering with average rating and the no. of downloads for a distinct comparison. The app data we used to select the final two apps contained the basic description, number of user ratings available, the average rating score.

Flo and clue are the 2 final apps that we shortlisted for our analysis. Both Flo and Clue are FemTech apps, a term coined by Ida Tin, the founder of Clue. These apps empower women by providing personalized menstrual cycle tracking and reproductive health insights. They utilize advanced algorithms to analyze user-inputs as data, including period dates, flow intensity, symptoms, and lifestyle factors, to predict cycles and identify patterns. Flo aims to destigmatize women's health and promote open conversations, while Clue focuses on data-driven insights to help women understand their bodies. Both apps have global reach and offer premium subscriptions for additional features like advanced cycle tracking, personalized health insights, and ad-free experiences. Ida Tin's pioneering work in developing Clue has significantly contributed to the growth and recognition of the FemTech industry (TechTarget, n.d.)

To achieve our stated research objective, data was collected on various review attributes, including content, upvotes, version number, and timestamp. A similar methodology was used in previous research on investigating FemTech app usability and privacy. To facilitate analysis, additional columns were extracted:1) Score: A numerical rating to measure user satisfaction. 2) Content: The actual text of the review for topic modeling and keyword analysis. 3) ReplyContent: The developer's response to the review. 4) ReviewLength: The length of the review to examine potential relationships with developer responses. 5) ReviewCreatedVersion: The app version at the time of the review to connect user experiences with specific updates and issues.

We scrapped approximately 253,000 user reviews from the Google Play Store (188,423 reviews for Flo and 65,307 for Clue). This large dataset, representing about 5% of total reviews for both apps, allowed us to delve into user sentiment, satisfaction, and feature preferences.

Data Preparation

Following data extraction, we cleaned the extracted reviews by removing duplicates and handling missing values. The review content was then formatted, and irrelevant columns were removed. To further analyze the data, we calculated review length and extracted temporal information like year, quarter, and version. Next, we cleaned data. This includes handling missing values, converting data types, and tokenizing the text using NLTK. Stop words are removed to focus on significant terms.

Exploratory Data Analysis (EDA) was performed to gain insights into the data. This included visualizing the distribution of ratings, identifying trends over time, and analyzing the relationship between review length and score (include graphs as figures and refer them here). This includes handling missing values, converting data types, and tokenizing the text using NLTK. Stop words are removed to focus on significant terms.

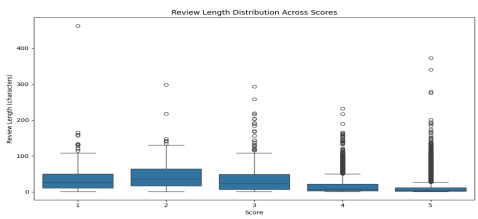

Figure 1 *Boxplot of Review Length by Rating for Flo*

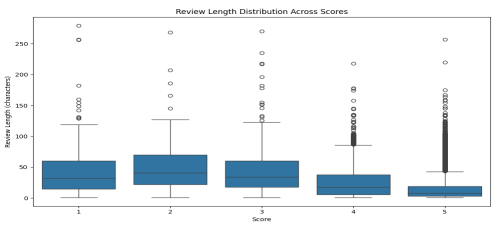

Figure 2 *Boxplot of Review Length by Rating for Clue*

A preliminary analysis of the review scores for both apps showed a moderate range of ratings. The standard deviation was 1.11 for Flo and 1.41 for Clue, indicating a similar spread of scores across the 1-5 rating scale.

Topic Modelling

First, we started with exploratory and descriptive analysis (See Table X). Notably, we found that both apps had around 80% of ratings that were 4 and above. If we were to extract topics from the dataset, it would not be representative of the user experience due to the higher volume of high scores. Furthermore, the review length also seemed to vary across low and high-rated reviews, with low-rated reviews having a higher average character length in both apps.

Therefore, we decided to split the reviews into low-rated (scores 1, 2, 3) and high-rated (scores 4, 5) categories Then we moved on to extract topics from the user reviews using Sentence Transformers (a.k.a. SBERT) (Sbert.net) as it is modelled to also include semantic search that gives us accurate and relevant search results rather than just matching keywords.

Sentiment Analysis

Sentiment analysis is performed using TextBlob and VADER. TextBlob provides polarity scores indicating positive or negative sentiments, while VADER is particularly effective for social media texts. The sentiment scores are added to the Data for further analysis (results are summarized in Tables 1-4).

By combining topic modelling, sentiment analysis, and N-gram analysis, we evaluated how well the app design aligned with user-centricity and attention principles of Design Justice in line with our research objective. This multi-faceted approach provided a comprehensive understanding of how the apps addressed user needs and distributed attention within the user base.

3. Findings and Analysis

Clue App
Low Ratings Topics

Table 1

Topic ID	Sentiment Score	Review Count	Reply Count	Topic Name	Topic Keywords	Representative Docs
1	0.056142	4,487	3	-1_app_period_update_years	[app, period, update, years, track, data]	[first download app 5 years...]
2	0.068601	4,320	288	0_app_period_update_used	[using clue used love...]	[using clue clue used used love...]
3	0.026850	288	3	1_sponsorship_makes_give_since	[sponsorship, makes, give, since]	[makes since]
4	-0.009610	203	3	2_account_email_sign_password	[account, email, sign, password]	[logged account account wo wo let...]
5	-0.010072	181	3	3_working_good_use_work	[working, good, use, work, hard, really]	[kinda working working know...]
6	-0.212595	155	3	4_que_de_la_se	[que, de, la, se, para, es, el, mi...]	[ok normalmente normalmente amo...]
7	-0.051559	127	3	5_subscription_pay_charged_cancel	[subscription, pay, charged...]	[need pay pay subscription...]
8	0.084520	56	3	6_wo_open_ini_let	[wo, open, ini, let, arabic...]	[app wo wo open...]
9	0.041733	18	3	7_stars_star_give_day	[stars, star, give, day, period...]	[using clue clue years years...]
10	-0.049950	12	3	8_geen_m6_voor_werkt	[geen, m6, voor, werkt, meizu...]	[na meizu meizu m6...]

Low Ratings Topics

Topic 6: There is negative sentiment regarding subscription or payment-related issues (Sentiment: -0.212595), where users might feel they are not getting enough value for their money. Topic 7: Frustration with the subscription payment model, especially regarding charges or cancellations (Sentiment: -0.051559). Topic 5: Concerns over account and password issues are affecting user experience (Sentiment: -0.009610). For CLUE's low-rated topics, reviews for issues like "app crashes and updates" (4,487 reviews) and "payment issues" (4,320 reviews) show a high level of dissatisfaction, but the reply counts are minimal, with "app crashes" receiving 3 replies and "payment issues" only 3 replies. Despite these being major concerns, developers are not responding to them as much as one might expect, leaving these users' complaints largely unaddressed. Smaller issues like "account login" (203 reviews, 3 replies) and "ads causing disruption" (181 reviews, 3 replies) also see limited engagement, further emphasizing the lack of response to user grievances in the low-rated segment.

Clue App
High Ratings Topics

Table 2

Topic ID	Sentiment Score	Review Count	Reply Count	Topic Name	Topic Keywords	Representative Docs
1	0.637485	25,715	3	-1_app_period_track_cycle	[app, period, track, cycle, love...]	[great app app really helps...]
2	0.587761	17,171	8,939	0_app_easy_great_use	[app, easy, great, use...]	[really useful useful easy...]
3	0.462125	11,336	808	1_love_good_really_helpful	[love, good, really, helpful...]	[love helpful, love helpful...]
4	0.038800	463	3	2_de_que_la_es	[de, que, la, es, muy...]	[yo siempre olvidaba...]
5	0.471286	273	492	3_years_using_year_since	[years, using, year, since...]	[using years, using years...]
6	0.252692	244	5	4_life_saver_live_without	[life, saver, live, without...]	[amazing life saver...]
7	0.438126	163	3	5_pink_flowers_simple_use	[pink, flowers, simple, use...]	[flowers pink pink love...]
8	0.465611	61	330	6_control_implant_birth_window	[control, implant, birth, window...]	[love control control period...]
9	0.000000	17	8	7_content_clue_	[content, clue]	[лучшее приложение...]
10	0.267153	17	3	8_bleed_bleeding_undies_bleeder	[bleed, bleeding, undies, bleeder...]	[helps really well bleed...]

High Ratings Topics

Topic 1: Strong positive feedback on period tracking, indicating users feel this feature is highly beneficial (Sentiment: 0.637485). Topic 2: Users appreciate the app's ease of use and quality (Sentiment: 0.587761), highlighting its overall effectiveness. Topic 4: Positive sentiment shows that users find Clue's features life-saving or essential, especially for tracking and managing health (Sentiment: 0.252692). For CLUE's high-rated topics, feedback on "period tracking" (17,171 reviews) and "ease of use" (25,715 reviews) reflects strong user satisfaction, but the reply counts are modest in comparison, with "period tracking" receiving only 3 replies and "ease of use" receiving 8,939 replies. The substantial review counts suggest these features are crucial for users, yet the limited responses from developers point to a focus on addressing negative feedback rather than reinforcing positive experiences. Smaller topics like "life-saving features" (244 reviews, 5 replies) and "control implant birth window" (61 reviews, 330 replies), which receive fewer reviews, attract more developer engagement, reflecting targeted attention to niche user concerns.

FLO App

Low Rated Topics

Table 3

Topic ID	Sentiment Score	Review Count	Reply Count	Topic Name	Topic Keywords	Representative Docs
1	0.112287	10,256	3	-1_app_premium_period_free	[app, premium, period, free, pay, get...]	[first got got app app years ago...]
2	0.120055	9,404	1,739	0_app_premium_pay_used	[app, premium, pay, used, get...]	[really used used love love app...]
3	0.225981	1,762	3	1_ads_many_besides_eish	[ads, many, besides, eish...]	[many ads ads remind...]
4	0.022285	856	3	2_period_13_age_app	[period, 13, age, app...]	[im 11 might get period...]
5	0.248406	596	3	3_good_accurate_far_use	[good, accurate, far, use...]	[pretty good good accurate...]
6	-0.047841	258	4	4_la_de_que_en	[la, de, que, en...]	[yo tenía tenía esta aplicación...]
7	0.105972	105	3	5_pregnant_chance_born_getting	[pregnant, chance, born...]	[hello updates updates see...]
8	0.034561	79	3	6_work_working_reminder_reminders	[work, working, reminder...]	[reminders work reminders work...]
9	0.007036	76	3	7_download_phone_trying_app	[download, phone, trying...]	[never download download app...]
10	-0.011292	39	3	8_800_partners_16_messages	[800, partners, 16...]	[чудовий функціонал функціонал але...]

Low Ratings Topics (FLO):

Topic 2 (app premium pay used) has the highest review count (10,256) but has only a moderately low sentiment score of 0.120055, reflecting frustration about premium features. Topic 6 (language localization issues) has a negative sentiment

(-0.047841), indicating non-English users face usability challenges. Topic 5 (pregnancy-related issues) shows higher positive sentiment (0.248406), indicating mixed experiences related to pregnancy features. Privacy concerns (not explicitly highlighted) may contribute to the overall negativity in topics with low scores. For FLO's low-rated topics, the review counts for common complaints like "premium period features" (10,256 reviews) and "payment issues" (9,404 reviews) are significantly higher than other topics, indicating these are widespread concerns. Despite the large number of reviews, the reply counts are low, with "premium period features" receiving only 3 replies and "payment issues" getting 1,739 replies, suggesting limited engagement from developers in addressing these complaints. Other issues, such as "pregnancy-related features" (1,762 reviews, 3 replies) and "app crashes" (856 reviews, 3 replies), also see similar patterns of user dissatisfaction with minimal developer responses. This low engagement, especially with high-volume complaints, could be seen as a missed opportunity for improving user satisfaction.

FLO App
High Ratings Topics

Table 4

Topic ID	Sentiment Score	Review Count	Reply Count	Topic Name	Topic Keywords	Representative Docs
1	0.624625	58,027	3	-1_app_period_track_love	[app, period, track, love...]	[period app app like...]
2	0.580879	47,797	3,706	0_app_great_best_love	[app, great, best, love...]	[love app app accurate...]
3	0.436800	41,232	2,516	1_love_good_far_best	[love, good, far, best...]	[far good, far good...]
4	0.498465	15,050	2,026	2_easy_use_accurate_helpful	[easy, use, accurate, helpful...]	[accurate easy easy use...]
5	0.432887	1,214	1,469	3_pregnant_get_pregnancy_women	[pregnant, get, pregnancy...]	[good pregnant pregnant women...]
6	0.085751	1,012	1,105	4_de_la_que_es	[de, la, que, es...]	[es una una app...]
7	0.383953	874	1,131	5_premium_free_flo_subscription	[premium, free, flo...]	[flo premium love app...]
8	0.329021	205	4	6_life_ca_easier_live	[life, ca, easier...]	[makes life life easier...]
9	0.009543	108	771	7_damn_300_100_pretty	[damn, 300, 100, pretty...]	[pretty damn damn accurate...]
10	0.722969	64	4	8_thanks_thank_awesome_perfect	[thanks, thank, awesome, perfect...]	[good thanks, good thanks...]

High Ratings Topics (FLO)
Topic 1 (period tracking features) has the highest sentiment score (0.624625) and a significant review count (58,027), highlighting its popularity. Topic 2 (app ease and quality) received the highest review count (47,797) and a strong sentiment score (0.580879). Topic 5 (premium subscription features) also scores highly (0.383953), indicating user satisfaction with paid features. Topics related to personalization and analytics (Topic 7 and Topic 8) are well-rated but have fewer reviews and replies. For FLO's high-rated topics, "period tracking" (58,027 reviews) and "ease of use" (47,797 reviews) dominate the feedback, reflecting the app's core strengths. However, even with large review counts, the reply counts are modest, with "period tracking" receiving only 3 replies and "ease of use" receiving 3,706 replies, indicating that developers may focus more on resolving negative issues rather than reinforcing positive feedback. Other positive topics such as "premium subscription" (874 reviews, 1,131 replies) and "helpful insights" (1,214 reviews, 1,469 replies), though smaller in volume, show higher engagement in response to specific user concerns, suggesting a targeted approach to addressing particular areas of satisfaction.

As the focus of this paper is to address the equitability aspect of app design, we moved on to address topics apart from these top represented topics. we found a lot of other significant yet not highly represented topics addressing rather unconventional aspects in FemTech. These topics highlight the diverse needs and capabilities of users that are often left under-represented as apps are built on normative ideals (Mishra et.al, 2023). We have attached the spreadsheet that contains these unconventional topics here.

The analysis of user feedback for both Flo and Clue reveal a nuanced landscape of diverse needs, capabilities, and expectations from menstrual and health tracking apps. While both apps share a commitment to empowering users through tracking tools, educational resources, and community features, user experiences reflect differences in how each app meets the unique demands of its audience. By exploring the shared strengths and challenges of these platforms, we gain insight into the varied ways people interact with health technology.

Flo and Clue serve as critical tools for users managing chronic health conditions such as PCOS, endometriosis, hypothyroidism, and hormonal imbalances. These apps are praised for offering comprehensive tracking options that help users understand their unique health patterns. For instance, a user managing PCOS highlighted the value of tracking irregular cycles, sharing that "It's heartbreaking when the app suggests taking a pregnancy test when I know I'm not pregnant due to my condition." Similarly, Clue users appreciate its scientific tone and emphasis on education, with one user noting, "Clue provides insights into hormonal changes in a clear and unbiased way, which is invaluable for managing my hypothyroidism." Despite these strengths, many users' express frustration with the limitations of these apps in accurately predicting cycles or providing tailored insights for irregular patterns, emphasizing the need for more personalized tools.

Educational content is a cornerstone for both Flo and Clue, addressing a spectrum of user knowledge levels. Young users navigating their first periods, as well as adults seeking deeper insights into fertility, contraception, or menopause, rely on these apps for guidance. Flo's approachable language and Clue's scientific rigor cater to different preferences, yet both face criticism for placing key educational resources behind paywalls. As one user commented about Flo, "Imagine a young girl starting her period, embarrassed to ask questions, only to find answers locked behind a subscription." Similarly, Clue's premium features, while seen as high-quality, can alienate users who believe essential health information should be freely accessible. These concerns reflect broader tensions between monetization strategies and the ethical imperative to provide universal access to vital health education.

Inclusivity is another significant theme in user feedback, particularly for users who identify as trans, nonbinary, or part of other marginalized groups. Both apps have made strides in adopting gender-neutral language and features to support trans and nonbinary users. A Flo user praised its inclusivity, stating, "Flo is really trans-inclusive, especially with the language used." Clue is similarly commended for its neutral and data-driven approach, which resonates with a diverse audience. However, some users feel that inclusivity should extend beyond language to include personalized tracking options and insights tailored to diverse gender identities and health experiences. The feedback highlights an ongoing need for both apps to refine their inclusivity efforts, ensuring they genuinely address the needs of all users.

Community support features in Flo and Clue provide spaces for users to connect, share experiences, and seek advice on sensitive topics. Flo's anonymous chat feature is especially popular, with users describing it as a safe space for discussing personal matters. One Flo user shared, "I love the secret chats where I can talk anonymously about my feelings and experiences without judgment." Clue, while less focused on social features, is appreciated for its factual approach and ability to foster a sense of reliability and trust. Despite these strengths, both apps face challenges in maintaining the quality and relevance of community interactions, as some users perceive these spaces as either overly commercialized or lacking in meaningful engagement.

Tracking tools and symptom logging are central to the appeal of Flo and Clue, enabling users to monitor cycles, moods, symptoms, and health patterns. Users value the comprehensiveness of these features, with one Flo user remarking, "Flo helps me track my moods, symptoms, and cycle timing, keeping me aware of how my body changes over time." Similarly, Clue is lauded for its clean interface and detailed tracking capabilities, with a user noting, "Clue's interface makes it easy to log symptoms and understand patterns without feeling overwhelmed." However, there is a strong demand for additional tracking options, such as dietary habits, bowel movements, and mental health indicators, to make these tools even more versatile. The integration of wearable devices and improved algorithms for analysing irregular cycles are also recurring requests, reflecting the evolving expectations of tech-savvy users.

Privacy and data security are pressing concerns for users of both apps, especially in the context of changing reproductive health laws. Some user's express anxiety about how their data might be used or shared, with one Flo user stating, "The app selling people's information for profit." Clue, known for its strong stance on data privacy, is often seen as a safer option, though users still seek clear assurances about how their sensitive information is handled. These concerns underscore the critical importance of transparency and trust in health apps, particularly when dealing with deeply personal data.

Both apps also face criticism related to their premium features and monetization strategies. While users acknowledge the value of premium content, they often feel that the constant upselling detracts from the user experience. A Flo user lamented, "The constant ads and prompts to go premium are reducing the appeal of the app," while a Clue user expressed a similar sentiment about the increasing paywall for features, they once accessed for free. This feedback highlights the delicate balance between generating revenue and maintaining user satisfaction, particularly among long-time users who feel alienated by recent changes.

Emotional and personal support during significant life events, such as pregnancy, miscarriage, and menopause, is another area of focus this is also highlighted in previous research (Park, Joo Young, et al., 2023). Users navigating these experiences rely on the apps for guidance, symptom tracking, and emotional reassurance. A Flo user navigating pregnancy shared, "Flo has been a lifesaver in helping me track my symptoms and prepare for the next stages of pregnancy." Similarly, Clue's detailed tracking and scientific insights are appreciated by those seeking clarity during transitional life stages. However, there is room for improvement in tailoring support to the unique challenges of each group, from providing more nuanced content to enhancing user interfaces for these specific needs.

4. Discussions and Conclusion

Our analysis of Flo and Clue user reviews revealed both strengths and weaknesses. Both apps excel in period tracking and user-friendliness, as reflected in positive sentiment. However, issues with premium subscriptions, advertisements, localization, account access, and refund policies emerged as common pain points. Notably, users often provide more detailed feedback in low-rated reviews. While high-rated reviews praise core features like predictive insights and life-saving tracking, addressing concerns about localization and premium features could further enhance user satisfaction.

Designing for Pluralism in user Centricity: Working Towards Irregularity as Norm in FemTech

The analysis of both applications reveals a concerning trend in the FemTech industry, which appears to primarily cater to a specific subset of women (primarily affluent customers and those whose body measurements align with clinical norms). Consequently, these applications are designed in accordance with healthcare needs based on biomedical and societal norms, failing to equally center all users and address their diverse needs. Instead of addressing the diverse and nuanced health needs of

women, Fem Tech is closely aligned with societal expectations that women are responsible for planning and managing their fertility, as well as market logics that prioritize profitability and specific customer segments.

Recent research in Information Systems has called for the design of technology in collaboration with user communities (Sultana et al., 2018; D'Ignazio et al., 2016; Massiero, 2023). This approach can help to ensure that technology is designed to meet the needs of diverse users, rather than perpetuating existing biases and inequalities.

This analysis suggests that Fem Tech development is driven by socioeconomic logic intertwined with conventional biological and medical taxonomies, as noted by other HCI scholars (Almeida et al., 2020). This reveals a limitation of the FemTech community to truly address the diverse and complex needs of women.

Designing for Inclusion: Paying Attention and Valuing Desires in Personalization of FemTech

As the market for these apps has evolved, newer applications have begun to recognize some diverse needs and offer more personalized predictions based on individual women's menstrual patterns. Currently, there is a trend among menstrual tracking apps to provide support for women with irregular cycles and menstrual conditions such as PCOS, Endometriosis, and Menopause. However, it is important to note that these applications have not yet gained significant traction and still tend to favor healthy cisgender females.

Therefore, Fem Tech, in its current form, can be seen as perpetuating conventional gender roles and prescribed notions of femininity. This aligns with broader issues of design justice in technology design (Kannabiran et al., 2018). In developing future Fem Tech solutions, it is recommended to avoid both universalizing and systemic personalization approaches. Instead, developers should continuously speculate and act upon technologies in a way that could positively impact women's health and experiences (Søndergaard, 2020).

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