Not Just Bleeders – Understanding Dissatisfied Users of Menstrual Tracking Applications

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Abstract

Menstrual tracking is a part of modern health and wellbeing monitoring. However, current menstrual tracking applications fail to cater for all potential and current users, resulting in a need to investigate user dissatisfaction at an advanced level. This study deepens understanding of the dissatisfied users of menstrual tracking applications. The results are based on 132 responses to a qualitative online questionnaire. The analysis of the data resulted in five factors describing causes for dissatisfaction and five groups comprising the needs of dissatisfied users. Dissatisfaction is caused by not fitting the identity, intended goals, process, or health condition of users. The focus should be shifted from tracking symptoms to predicting them, and to monitoring the menstrual cycles holistically, as well as designing for user identity. The results advocate a reformation in conceptualizing menstrual tracking applications through inclusivity of human dimensions.

CCS Concepts

• **Human-centered computing**; • **Human computer interaction (HCI)**; • **Empirical studies in HCI**;

Keywords

menstrual tracking, self-tracking, dissatisfaction, gendered health, inclusivity, user interface design, period, personal informatics, women's health, transgender health, identity

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1 Introduction

Digital health solutions can have a positive impact on women's health and wellness [17]. Mobile health application use increases knowledge of the body, illnesses, and healthcare. The benefits of menstrual tracking apps include personal physical and mental health [30], and support healthcare professionals via data-driven insight [22, 31]. The apps have an empowering effect, as they offer support when deciding upon engaging in more official channels of healthcare [35]. Menstrual tracking applications are mobile applications (apps from now on) designed to follow menstruation and menstruation-related matters. They are used to understand health as well as monitor menstrual cycles, control pregnancy, and prevent gynecological illnesses [9]. Approximately 50 million people worldwide use the apps [40], yet research shows that they do not support all potential users with their varied needs [15, 32].

The experience of menstruation varies between individuals, with identity (beyond biology) playing a key role in the significance of the process upon the life of the people who menstruate [12, 13]. For this reason, in the field of human-computer interaction (HCI) and design of technologies related to menstruation, understandings of the intersection between the biological experience, identity and how technology manifests these processes, are highly pertinent. In particular, scholars in the area of feminist HCI have endeavored to capture the nuances pertaining to diversity and inclusivity in design, in light of discussions that negotiate the territories of biological sex and gender (see, [3]). This ignites urgency to understand the social-cultural dynamics underpinning how we perceive the end users of technology against a history fraught by oppression and discrimination against women and female biological processes, in addition to gendered self-identity [11, 39].

Based on this complexity, diversity among users of menstrual tracking apps, and potential sources for dissatisfaction, are linked to several causes. The first menstrual period occurs during puberty and the last during menopause. Users may undergo various life events and health situations throughout this expanse of time. In addition, the timing and consistency of menstrual cycles vary between individuals [15, 21]. Although menstrual tracking apps are usually designed for women, not all people who have a menstrual cycle are women [15, 37]. Even though the diversity of the users is acknowledged in previous research, it lacks detail in probing diversity and related needs, as studies on the experiences related to menstrual tracking apps often focus on users who are cisgender women [8, 21, 34], young [21], and have regular menstruation [22].

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In this paper, a feminist HCI lens, whereby feminist theory is applied to HCI scholarship to critically analyze technology, its properties and design, is used as a backdrop to investigate dissatisfied users of menstrual tracking apps, through the lens of gender and associated matters [3]. We examine the experience of previous, current and potential users who are not satisfied with the menstrual tracking apps. We argue that by probing aspects of inclusivity and diversity within design assumptions applied to the development of menstrual tracking apps, we can better understand implicit underlying mechanisms for dissatisfaction. The perspective of dissatisfied users reveals norms within design assumptions that fulfill the needs of only part of the potential user base. The research question we address here is: What are the factors preventing menstrual tracking apps from serving all potential users? We collected the research data through an anonymous online questionnaire to understand the needs that are not being met when a person identifies as a 'dissatisfied user' of menstrual tracking apps. The current paper makes several important contributions to HCI scholarship and app design. Our study reveals that menstrual tracking apps can be seen as an augmentation and actuation of gender and life goals. In which case, designing for a homogenous user base is inadequate. We urge developers to understand the significance of user experience (UX) design in supporting diverse biological and socio-cultural needs among users.

2 Background and related work – menstrual tracking apps and gender in HCI

Scholars in the field of HCI have increasingly focused on peripheralized issues and marginalized peoples, in designing the everyday. The area of women's health and reproduction has held and can still hold stigma and various taboos across global societies [29, 43]. For this reason, the last few decades have marked a turn, as efforts have been re-directed towards improving the health and wellness for all. This is also reflected in the United Nations Sustainable Development Goals (particularly Goal 3 - Good health and well-being [46]). The current section focuses on how menstruation and its tracking have been studied in the fields of HCI and design, whereafter menstrual tracking apps and their use are described. The intricacies of gender and identity within design are subsequently observed – mainly via aesthetics and app functions, as well as issues that should be considered from design conceptualization onwards, calling for inclusive approaches to design methodology (i.e., participatory design).

2.1 Menstrual tracking in HCI and Design

Over the past decade a range of different mobile apps and other interactive systems have been developed and introduced to the market across all areas of health and wellness [26]. The design of these applications is pertinent: they need to be accurate and detailed in features and functions, coupled with high quality data collection with robust data handling processes, and clear information visualization [15]. The apps need to speak to their users, with respect to their cultures (see [11]). This means that not only is the usability, relevance and trustworthiness of the apps crucial, but UX in terms of personal identity and significance, is essential (see [2], [39]). For these reasons the topic of menstrual tracking apps has been adopted by scholars in the field of HCI. Research has delved into the design of menstrual tracking apps [19] and its cultural responsiveness [33]. UX methods such as personas [39] have been utilized, and experiential perceptions of these apps via the lens of period-positive ecologies and empowerment [44, 45] have also been explored. Other studies on the topic have been performed in areas such as menstrual health informatics [16, 19, 20], which refers to a sub-domain of health informatics - the utilization of digital technology to collect, process and study health-related data [41].

Previous HCI research in the area of menstrual health and tracking have highlighted the ongoing cultural stigmatization of menstrual cycles [44]. The authors highlight that information technology offers potential for empowering people who menstruate, particularly in cultural contexts where the entire area of reproductive health and wellness is shunned. For instance, in India discussions on menstruation are linked to those of toilet and sanitation facilities - also matters strongly tabooed in the cultural eye [20]. Thus, mobile technology (i.e., tracking apps) and infrastructure are intrinsically connected to gender, attracting the attention of multidisciplinary communities of feminist and queer scholars (see e.g., [4, 7, 10, 14]).

2.2 Menstrual tracking apps

A menstrual tracking app, also known as menstrual or period tracker, is an application that enables the monitoring of menstrual cycles. In addition, these apps may be used for weight, mental health, and sexual activity monitoring. The apps may also remind about the usage of contraception and send information about stages of the menstrual cycle [19, 22, 28, 30]. Menstrual tracking apps monitor and track different stages of users' cycles, and may even be combined with other data to explain how the mind works in relation to these stages (i.e., due to hormones) [15, 21, 28]. There are various reasons and goals for menstrual tracking which are shown in Table 1 [8, 15, 23]. It should be noted that one individual can have multiple reasons and intentions for using the technology, which may change over time [8, 15, 23].

Table 1 illustrates four main reasons for using menstrual tracking apps: 1) monitoring and understanding the cycle and body; 2) preparation (for menstrual flow); 3) controlling pregnancy; and 4) information sharing. It can be observed that monitoring and understanding the body's cycle is associated with a broad range of actions that inherently relate to other aspects of health and wellbeing (e.g., mood, physical activity, and weight). Previous studies have indicated that if apps are no longer perceived as needed or useful, or users are not satisfied with the technology and its design, they may cease to use them. According to Bretschneider [8], the main reasons for uninstalling apps are: complexity, difficulty in using the apps, general dissatisfaction, and unreliable, untrustworthy predictions. Some users stop using menstrual tracking apps when they learn to know their cycle, or their periods stop [30]. Individuals may also cease to use these apps out of concern for privacy [30]. Yet, other reasons are described in the sections below.

2.3 Feminist HCI, gender and identity in design

As an area that applies feminist theory to understanding the intricacies of gender in HCI, feminist HCI helps deconstruct and examine issues of empowerment or disempowerment, diversity, inclusion and exclusion, pluralism, advocacy and participation in HCI design

Table 1: Reasons to use a menstrual tracking app

Reason	Action	Reference
Monitoring and understanding cycle and body	tracking menstruation	[15, 21-23, 30, 32]
	tracking mood	[8, 16, 17, 22, 30]
	tracking PMS symptoms	[22]
	understanding menstruation and body	[8, 15, 30]
	tracking physical pain	[8, 15, 30]
	tracking insomnia	[15, 30]
	tracking physical activity	[15, 30]
	tracking ovulation timing	[8, 30]
	tracking fertility	[8, 32]
	tracking bloating	[32]
	monitoring sexual activity	[30]
	monitoring libido	[30]
	monitoring body temperature changes	[8, 30]
	following medication use	[30]
	monitoring weight	[30]
	tracking food cravings	[30]
	monitoring acne	[8, 21, 33]
	searching for symptom patterns	[8, 21]
Preparation	preparing for the menstrual flow	[8, 15, 30]
Controlling pregnancy	aiming to conceive	[8, 15, 21–23, 30]
	avoiding pregnancy	[8, 15, 21–23, 30]
Information sharing	collecting and/or sharing information to health care specialist	[15, 21, 22, 30, 32]
	sharing information to one's partner or other loved ones	[21, 22, 32]

practice [3]. This is particularly pertinent in the context of design, and particularly the design of menstrual tracking apps as a substantial portion of users are women, and all users embody female reproductive systems [15, 18, 22]. While in digital health and design women are often understood as a homogenous group [16], in reality they have different needs and goals, while living in diverse conditions [1]. Products designed for women are often oriented towards a small niche of the population, unable to represent the entire user population [1], who presumably like small, pink, cute aesthetics as well as hearts and flowers [15, 38]. Women belonging to this niche are those who, for example, are young, white, thin, heterosexual, possess full mobility, and want to reproduce [1, 24]. Women of color, LGBTIQ people, and older age groups, are excluded from the app user definition [24]. Stereotypical gendering of design can deter the engagement of many users and potential users [1], and some experience this as hurtful and belittling [16, 21].

Furthermore, menstrual tracking apps often overlook the fact that not all app users are women [1, 15, 18, 37]. This is often neglected in the design [9, 19] and marketing [24] of many menstrual tracking apps. Previous studies show that an app's usability and acceptance can be improved by increasing its inclusiveness (i.e., via participatory or co-design) and thus designing them with an insider understanding for gender-sensitivity [30]. There should be no assumption about the gender of the user, their sexual-orientation, or their sexual partner [15]. The design of an app should consider users of different ages, cultures and sexual orientations [32]. It is dismissive to assume that the user represents a predetermined homogenous stereotype or that the app should be designed just for women. Studying dissatisfied users reveals design implications that may better serve users who do not fit the mold of the target group. Moreover, isolating triggers for dissatisfaction and subsequent incorporation of adjustments in future design iterations may also attract new user groups.

3 Method

Data was collected via an online questionnaire, and was analyzed by thematic analysis [35]. The anonymized nature of the questionnaire made it easier for respondents to share intimate experiences [5, 6]. The study complied with the Finnish Code of Conduct for Research Integrity by the Finnish National Board on Research Integrity, and was conducted in accordance with the General Data Privacy Regulation. Data was gathered in February 2024. The questionnaire was distributed in Finland and the language of the questionnaire was Finnish. The respondents of the online questionnaire were recruited through the first author's social media network on Instagram, Facebook, and LinkedIn, and via the channels of Lune Group Oy Ltd (Lunette) and Tiedenaiset Oy. Lunette is a Finnish company that focuses on sustainable products for menstrual and sexual health. Tiedenaiset is a multidisciplinary community led by women that shares scientifically proven health information through social media and other channels. The channels of Lunette and Tiedenaiset helped reach a wide audience of potential respondents.

Table 2: Demographics of the respondents (N = 132)

Demographic information	Number of respondents
Self-Identified Gender	cisgender women (125), non-binary (4), transgender man (1), woman (1), queer (1)
Age	<20 (1), 20-29 (73), 30-39 (45), 40-49 (12), 50-59 (1)
Application Usage	previous users (46), current users (71), potential users (16)
Menstruation Regularity	variance in cycle length: 0-2 days (26), 3-5 days (40), 6-8 days (19), >8 days (29); no menstrual flow (11); pregnant (5); menopause (2)

3.1 Questionnaire

The questionnaire was built on the findings of previous studies [15, 21, 30, 36] related to dissatisfaction with menstrual tracking apps. Lunette was consulted during the design of the questionnaire due to their expertise and experience regarding menstruation inclusivity. Based on the comments of Lunette, two questions were added, and one question was modified. The questionnaire was piloted twice before distribution [6]. First, two self-reported dissatisfied users, found through the first author's social media network, responded to the questionnaire. Thereafter, some questions in the questionnaire were modified and new questions were added. Subsequently, three dissatisfied users piloted the questionnaire. The pilot phase answers were not included in the research data.

The questionnaire (see appendix A-1) started with a short introduction, whereafter the participants were asked to answer a screening question confirming that they belong to the group of dissatisfied users. The questionnaire included three background questions, two closed-ended multiple-choice questions, and four to nine open-ended questions. The number of open-ended questions depended on the respondents' answers in the background questions. Previous research informed the generation of the questionnaire. For example, the answer options for the reasons why the user had used a menstrual tracking app were derived based on [8, 15, 21–23, 30, 33]. Also, as previous studies [15, 21] have highlighted the design as a source for dissatisfaction, the respondents were especially asked about their opinion on the outlook of the apps.

3.2 Participants

We received 133 questionnaire responses. One response was eliminated because the respondent had not acquainted themselves with menstrual tracking apps and thus did not fit the study's definition of a dissatisfied user. The demographics of the respondents are described in Table 2. Most of the respondents were current users of menstrual tracking apps (n = 71). The second largest group was the previous users (n = 46), and the rest of the respondents belonged to the group of potential users (n = 16). In the questionnaire, previous users were defined as users who had used a menstrual tracking app over the past three years but had stopped using it. Current users were participants who reported that they used menstrual tracking apps at the time of answering the questionnaire. Potential users were participants who reported that they would like to use menstrual tracking apps, but had not found a suitable one. However, one respondent was moved from 'previous users' to 'current users' after their responses showed that they were currently using an app.

3.3 Data analysis

Excluding background questions and the multiple-choice questions, there were 906 open answers, totalling approximately 14 600 words. We conducted thematic analysis according to the steps suggested by Braun and Clarke [5]. Initially, the first author read through and grouped responses by topic of the response. Responses containing more than one topic were divided into two or more parts. When all responses were grouped, the groups were given names (coded). As a result of the coding, 121 codes were derived from the data. After that, the first and second author discussed and refined the codes. Then, the first author created the final codes by combining codes that were closely related, and generating new codes if the original code was too broad. This resulted in 78 codes, which then were grouped into 13 themes by combining related codes together. In the next step, the themes were given names and the relationships between different themes were refined, resulting in one extra theme being added. Finally, the analysis resulted in five themes describing the factors that cause dissatisfaction, and nine themes describing the needs of dissatisfied users. The nine themes describing the needs were further divided into five groups. The analyzed data included altogether 677 occurrences of the themes, from which 78 were related to the causes of dissatisfaction, and 570 to the needs of dissatisfied users.

4 Findings

The findings reflect the needs that are not met by menstrual tracking apps when a participant describes themselves as a 'dissatisfied user'. This section starts by presenting the factors causing dissatisfaction, and then progresses towards outlining the personal needs of users in relation to the app design.

4.1 Factors that cause dissatisfaction among users of menstrual tracking apps

The analysis resulted in five factors that cause dissatisfaction among the users of menstrual tracking apps, which are described in Table 3. The data included 78 occurrences related to these factors.

Many users with variation in their menstrual cycle length felt that the apps failed to predict the timing of the periods. This happened especially when the length of the users' menstrual cycle was shorter or longer than the length that had been coded into the app for a minimum or maximum cycle. Respondents reported cases where the app had not accepted the length of the cycle, or had recommended consulting a doctor, although the user knew the reason for the variation in the cycle. Respondents wished that they could input information that may affect cycle variations such

Table 3: Factors that cause dissatisfaction (N = 78)

Factors	Occurrences	Frequency (%)
The app does not account for varying menstrual cycle length	32	41
The app is not targeted to the user	19	24.4
The app focuses on controlling pregnancy	14	17.9
The app does not account for health conditions affecting menstruation	10	12.8
The app does not account for fertility treatments	3	3.8

as hormonal birth control and perimenopause. Also, respondents who did not have menstrual flow but had a menstrual cycle (e.g., hormonal contraceptive users) wished they could use an app to track the cycle. But, these respondents felt that the apps overly focus on menstrual flow.

The distress of not feeling that they fit the image of the intended target user was also a cause for dissatisfaction. Some respondents experienced the apps as heteronormative and designed for cisgender women in their fertile age. This caused dissatisfaction when the supposition of gender and identity of the user did not match the actual gender and identity of the user. Overall, the apps were experienced as representing a feminine aesthetic style, whereas many felt that a neutral outlook (which is explained in more detail in 4.2.1) would be a better option. Their attitudes expressed a disappreciation of assumptions made by designers, both in terms of aesthetic decisions, as well as in terms of who would use the app, and for what (i.e., transsexual men attempting to conceive). Thus, aesthetics tie into simplistic suppositions, rather than recognizing the complexity of contemporary gender construction.

> "I´m a male with a transsexual background, and I hope that the apps would not force a gender onto the user. I have had difficulties finding a menstrual tracking app as well as a pregnancy app that would not assume that I´m a woman." [P29]

Although menstrual tracking apps are used in both preventing pregnancy and as a support for conceiving, these aims are not valid for all users. For example, the respondents highlighted that their need to monitor and predict the timing of ovulation does not necessarily have anything to do with controlling pregnancy. The excessive focus on pregnancy caused dissatisfaction for users who could not get pregnant, and for those who were not interested in the topic. The focus on pregnancy felt for some as steering the user, described as "pushing into trying to get pregnant" [P101] and "luring to make babies" [P56]. The respondents wished that the user could input whether or not controlling pregnancy was relevant for them. They also wanted to be able to change their preferences, when their life-situations change.

> "I hope that one could input their contraceptive into the app. I´ve gone through sterilization, so I don´t need the force-fed pregnancy information from the app." [P36]

There are several health conditions that affect menstruation, and apps may fall short of assisting users who have special needs because of health issues. For example, respondents with endometriosis and polycystic ovary syndrome (PCOS) felt that the apps did not cater to their needs with tracking symptoms and medications related to their condition. Respondents also mentioned mental health as a component that should be monitored in conjunction with menstrual cycle. This was important particularly since it was acknowledged that menstrual cycles may affect, for example, depression symptoms. Three respondents, who all belonged in the category of 'previous users', reported that they experienced menstrual tracking apps as failing to take into account infertility treatments. Supporting and acknowledging users going through fertility treatment could be achieved, for example, if the apps would include possibilities to track the timing of the treatments.

4.2 The needs of dissatisfied users

The research data included 570 occurrences related to the needs of users. These occurrences were sorted into nine types of needs, and from these five groups were formed (see Table 4). The groups were: UX design; menstrual and reproductive health; economic motivation; knowledge and data; and holistic health management.

The largest group emerging from the data was that of UX design. With 255 occurrences it represented 44.7% of the total occurrences. Yet, in terms of needs alone, respondents emphasized their desire for apps to acknowledge their entire menstrual cycle. This was slightly higher than the mentioning of "better UX". The need for a neutral aesthetic design as well as being able to use the app free-of-charge were also frequently addressed in the responses.

4.2.1 UX design. Regarding UX design, three needs were identified: better UX, neutral design, and personalization. UX can be understood in a range of ways: the logic and aesthetics of the design itself or the broader understanding of how the technology and its design are experienced in the lives of users (see e.g., [42, 48]). In the context of the present study for instance, we observed that the factor of significance (i.e., what the app meant to the identities and life situations of users) and stress (how the app, its characteristics and functions, influenced stress in the lives of users) arose as concerning UX characteristics. Thus, the point of 'good' (satisfactory, fulfilling, or "life-ready") UX was one of the central needs pinpointed by respondents. The users hoped it would be easy to record issues on the app, and to find information. Data visualizations and the possibility to tailor the app were seen as means to reach better UX. The dependability and data security of the app were also seen as important – users did not want to share their data for commercial use, but wanted to keep their privacy in everyday situations. The wish for privacy is also reflected in the following example, where the user hoped that the app would allow for discreet use: "– not

Table 4: Needs of dissatisfied users (N = 570)

Group	Needs	Occurrences	Group Occurrences	Group frequency (%)
UX design	Better UX	152	255	44.7
	Neutral design	73		
	Personalization	30		
Menstrual and reproductive health	Entire menstrual cycle acknowledgement	165	191	33.5
	Hormonal contraceptive acknowledgement	26		
Economic motivation	Free apps	61	61	10.7
Knowledge and data	Knowledge source	36	46	8.1
	Sharing and exporting data	10		
Holistic health management	Overall health monitoring	17	17	3

so that a giant text pops up on the screen, saying WRITE YOUR MOOD TO MENSES APP!" [P22].

The wish for a neutral design of the user interface was raised continuously. The aesthetic properties of the design were hoped to be neutral, formal, and suitable for a health app. By 'neutral', we interpret that the participants were referring to colors not strikingly associated with femininity (i.e., pink, pastels etc.), as well as minimalist style (devoid of pure decoration) within the user interface elements. The cute and child-like designs of the apps were mentioned frequently in the responses.

> "Many apps have childish designs. Which probably is nice if you're a teenager, but as a +30-year-old it would be nice to have a more adult-like design, even if pandas are cute [grinning face with sweat emoji]" [P82]

Respondents were divided regarding the color-palettes in the apps, as some wished them to be colorful, despite many requesting "neutral". Red as the main color however, was seen as overemphasizing the menstrual flow.

The need for personalization was related to both functions and aesthetic design. Users have different goals regarding conceiving, and they would like to be able to inform the app about these goals. Respondents additionally wished that they could change the notifications and recordable symptoms to better fit their needs. This included functionalities such as weight monitoring, and pregnancy-related functions. When further analyzing these responses, we may interpret user desires and needs as entailing more agile, flexible and adjustable properties within the design. In other words, greater user control within the apps to ensure that all the desired elements are tuned in a way that reflects the identity and intentions of the user.

4.2.2 Menstrual and reproductive health. Regarding menstrual and reproductive health, two needs were found: entire menstrual cycle acknowledgement, and hormonal contraceptive acknowledgement. The respondents highlighted the importance of the tracking app to acknowledge the entire menstrual cycle, and not just the menstrual phase. Monitoring the whole cycle was seen as giving important information that will result in a better understanding of the menstrual cycle and its changes.

> "[I want] To better understand which kinds of aspects and feelings are connected to a specific phase [of the cycle]. Also, I would like to get information such as in part X of my cycle, I seem to have symptom X." [P117]

Also, the possibility to receive predictions or reveal patterns from user-inputted data ("– my cycle seems to vary in cycles of long-short-long-short, and the apps, of course, always use the average of these –" [P84]) in menstruation-related symptoms was perceived as missing. The apps should acknowledge the usage of hormonal contraceptives. Six respondents mentioned that they stopped using their menstrual tracking app because it did not work properly in conjunction with hormonal contraceptives. Respondents wished to be able to inform the app when they start or stop using a hormonal contraceptive, and to see how it affects the menstrual cycle. Users would benefit from reminders about contraceptives. Also, while users take the time and effort to input relevant data, they are still presented with invalid information that is not only irrelevant, but neglects the user's state that is explicitly described in data fields.

> "Some apps start to immediately estimate the chances of pregnancy, if you track unprotected penetration, even though the app knows you have, for example, an IUD or contraceptive implant". [P82]

4.2.3 Economic motivation. Many respondents expressed the need for free apps. Respondents were annoyed by exclusive content and advertisements that popped up on the screen. Some had even stopped using apps because of this annoyance. More than half (71/132) of the respondents were not willing to pay for apps. This was due to various reasons. Some respondents did not experience the apps as providing enough value for money, and some motivated their opinion with economic reasons. Some respondents proposed that the apps should be free, since using them is part of taking care of one's health and the apps should be available for all regardless of their financial situation.

> "In my opinion, making users pay for the apps is creating more inequality in costs that usually falls on women (tampons, contraception, medicine, doctor appointments). The apps are useful in everyday life, and it's nice that highly sensitive matters don't need to

> be marked in my calendar, next to other schedules." [P44]

Here, there is acknowledgement of the inequalities of the needs of the people who menstruate in terms of financial expenses, with the added burden of paying for an app. There are also two more points that can be obtained from the prominence in the lack of willingness to pay: 1) the injustice of making people pay for an app that arguably everyone benefits from (i.e., related to societal and health-related costs); and 2) the 'App Society' in which conscious consumers feel burned when faced with a bill for an app that will no doubt also profit on other user-related sources such as the personal data itself.

4.2.4 Knowledge and data. Two needs were identified in relation to knowledge and data: need for the app to function as a knowledge source, as well as sharing and exporting data. The respondents highlighted the need to use the app to gain knowledge. The types of knowledge can be divided into general knowledge and personalized knowledge. General information was wanted especially on the hormonal changes and their effects on the body and mind, exercise, and working. Respondents wanted the information to be provided at the right time: informing how to sleep, eat and exercise in the respective phase of the cycle. In addition to general knowledge, respondents wished that the app would provide them with personalized knowledge about patterns related to their cycle. Moreover, the app could use the user-inputted data to give guidance on how to support wellbeing in different phases.

> "Since I give a lot of information about my symptoms and cycle, I would like to get conclusions based on that data. – Currently all the information I get from the app is based on averages of everyone. I'm not interested in something that is general, instead I want the app to interpret specifically my own data, and make observations from that." [P117]

One of the reasons to use a menstrual tracking app was stated as being the ability to collect and save data for healthcare professionals: "My goal was and still primarily is to monitor my periods for doctor appointments." [P99] In addition to sharing data with healthcare professionals, respondents wanted to be able to export the data to import into another device or app. One respondent also mentioned wanting to let their partner see their current cycle phase.

4.2.5 Holistic health management. Many respondents wanted to use the apps to follow overall health. Respondents experienced that the menstrual cycle affects wellbeing and health, and noticing changes in the menstrual cycle can help in regards to contacting healthcare when needed. Respondents wished to be able to follow all health data in one app as it is easier than using several different apps. Also, more than half of the respondents (80/132) would be willing to combine data collected by other smart devices (e.g. smartwatches, or smart rings) with the menstrual tracking data.

> "It would've been great, if the app would have shown a better estimate based on the data that I have entered, and if the app would be able to automatically use the data from smart watches" [P6]

Menstrual tracking apps could benefit from data collected and analyzed in other apps in order to make better, more optimized predictions, as well as to help in the overall health monitoring including the menstrual cycle, wellbeing, health and sports. Clearly, menstrual cycles are seen as a part of overall health and should not be separated from the rest of health monitoring.

5 Discussion

The results of this study show dissatisfaction arising from designers failing to understand the holistic significance and functions of the apps, as well as the diversity among end-users, their changing life-situations, and identities, highlighting the implicit assumptions of the typical user in digital health solutions addressing women's health (i.e., FemTech). Using feminist HCI [3] as a lens to gain perspective on dissatisfied users, this study informs future research by giving a voice to users with a variety of backgrounds that affect satisfaction in the context of menstrual tracking. Especially identity arose as a contributing factor to how the participants responded to the UX design, rendering shrink it, pink it, approaches as undesirable. Moreover, physiological factors such as age, menstruation irregularity, and age, also played a part in rejection of current designs. While there has been some note in earlier studies that menstruation irregularity affects the satisfaction of the apps [15, 21], most previous studies (see e.g., [22]) have focused on users with regular menstruation. In this study, a significant amount of the respondents had variance in their cycle from people with no menstrual flow at all to people who had cycle variance even up to over eight days. There were people experiencing pregnancy or menopause, as well as users who have health conditions or who use hormonal contraceptives that affect the menstrual cycle. In addition, the study covered groups of previous and potential users of menstruation apps, pinpointing problems that the most dissatisfied users - those who have determined that the apps will not serve them - face.

Focusing on the needs of the dissatisfied users reveals deficiencies in the design of menstrual tracking apps. While users expect holistic tracking of the menstrual cycle and its symptoms, in alignment with earlier study findings (e.g., [17]), responses show that many apps focus solely on menstruation. Whereas previous research [8, 15, 21, 22, 30, 32] has focused on symptom tracking, our findings highlight the importance of the apps in predicting and preparing for these symptoms, while desiring to understand menstruation in the context of general health. The respondents hoped for information about the different phases of the menstrual cycle, and especially about how it affects their body, mind, and overall well-being. The lack of these aspects reinforces the relevance of earlier observations pertaining to feminist HCI, whereby women's health and reproduction-related issues are peripheralized, tabooed, and negated in technology development and overall societal strategy [43, 44]. In addition, in line with the arguments of Bardzell [3], participants were sensitive towards identities being forced on them. They desired inclusive, participatory design methods to account for their diverse identities. These findings pave the way for future studies to acknowledge the intersectional dimensions that emerge when exploring the shortcomings of current digital health applications.

5.1 Design implications

Prior research has uncovered user requirements and improvements for menstrual tracking apps [8, 15, 20, 22, 23, 30, 32]. Yet, as the focus here is on dissatisfied users, this new angle has revealed novel aspects to consider when approaching the design of these apps. The most important design improvements are:

- enabling tracking of the entire cycle instead of only menstrual flow, while predicting symptoms
- offering wider and more adjustable tracking possibilities (e.g., sports, sleep, and nutrition) to support holistic health monitoring,
- enabling the apps to function with different types of cycles (affected, for example, by hormonal contraceptives or menstruation-related health conditions),
- offering the possibility to adjust app features (e.g., aesthetics and functions, based on own goals and identity).

As pinpointed also by previous studies [15, 21], menstrual tracking apps have troubles in predicting irregular cycles which could be improved e.g., by utilizing the user's own data instead of averages. Menstrual tracking apps should acknowledge and be adjustable based on possible health conditions (physical and mental) that affect menstruation or are affected by the menstrual cycle. Similarly, it would be beneficial for users to be able to follow cycle-related symptoms, even when the user does not have menstrual flow. Also, tracking functions should be more adjustable with extra options, including offering the possibility to record medicine intake, fertility treatment, and results of pregnancy or ovulation tests. Furthermore, even though many users utilize the menstrual app to avoid pregnancy or to conceive, conceiving is not necessarily relevant to all users. It should be possible to adjust the app's features based on the goals and characteristics of the user, which might (and do) change over time. Design approaches and principles conducive to mitigating the effects mentioned by dissatisfied users are:

- designing with a neutral look and language,
- providing an overview of cycle, symptoms, and other information that is relevant to the user,
- supporting interoperability (i.e. being able to use data on other apps and devices and to combine health data),
- supporting the possibility to share data with healthcare professionals,
- providing the possibility to personalize aesthetic design for different identities,
- providing the possibility to personalize notifications, alerts for different needs, and privacy preferences.

If the designers strive for long-term users, the apps need to cater for the user and their changing life situations from menarche to menopause. More than half of the respondents were not willing to pay for the apps, which was partly due to the fact that they did not experience the apps as providing enough added-value to operate as paid-for services. This means that design shortcomings may end up costly. In other words, major improvements and more added-value are needed in menstrual tracking apps before this group of dissatisfied users will be willing to pay for use.

Beyond the practical design recommendations, our findings contribute to broader theoretical discussions on digital health technology design. The findings reveal that dissatisfaction is not only a negative outcome, but also a valuable resource and entry point for inclusive design of health and wellness apps. Involving dissatisfied users helps to uncover exclusionary design choices that reflect assumptions and norms that do not match with all potential users. Through inclusive design methodology (e.g., ethnography, participatory design, or co-design) differences between users should be recognized and accounted for already in the planning stage of development. The findings represent a symbiotic relationship between app design and identity in UX. The design choices shape not only the UX of the application, but also the identities and health conditions deemed appropriate, mirroring the power and normativity involved [3]. The study highlights how identity affects the experience of the apps as a source for biological information and socio-culturally.

5.2 Limitations and future work

There are several limitations to our study. We acknowledge that our positioning as cisgender women from WEIRD (Western, Educated, Industrial, Rich and Democratic) societies [25] with our own experiences of life situations related to menstruation affects the way that we approached this research, and how we interpret the results. Also, the results reflect the views of individuals existing in WEIRD cultures and societal conditions. Finland has a high-level of e-healthcare services [27, 47], which may affect the demands of the users. The results of this study could be compared to experiences from individuals in other cultures to see whether the causes for dissatisfaction and needs of dissatisfied users differ. Most of the respondents were cisgender women, resulting in the opinions of other gender identities as being less represented in the results. Previous studies [15, 37] indicate that sexual minorities have not been well considered in the design of menstrual tracking apps. In this study, we did not ask about respondents´ sexual orientation and the matter did not arise in the open responses. Future research should further delve into sexuality.

Although the questionnaire consisted of open-ended questions, it did not offer the possibility of further elaboration on answers. While conducting the study, it became evident that this is a topic that people are willing to discuss (at least in WEIRD societal contexts), and we see that an interview study could be a beneficial continuation to add to the details of these results. Nevertheless, we experience that the questionnaire served the study well in allowing the respondents to share intimate details of the causes for dissatisfaction. By deepening the understanding of causes for dissatisfaction, this study has paved the way to identify the diverse groups of menstrual tracking app users. The root causes for the dissatisfaction are somewhat fluid. One user may have several reasons for dissatisfaction, and may also move from one user group to another due to changing life-situations, i.e., aging, family status, transitions etc. The study has uncovered a neglect in acknowledging the significance of apps as an augmentation of gendered identity, goal-setting and expression. Future studies should venture deeper into socio-culture and psychological aspects of dissatisfied user groups. The study highlights how identity affects the ways we experience the applications and what the consequences are when technology fails to fit our identity. We see this as an important indication of worthwhile future research directions.

6 Conclusion

By focusing on the dissatisfied users of menstrual tracking apps, this study contributed to building knowledge to reform our conceptualization of menstrual tracking apps and their design. Designers need to move beyond stereotypes and self-understandings, to examine the factors and facets of health and wellness apps that should either: a) remain constant between users; or b) be adjustable in order to cater for individuals in their totalities. Menstrual tracking apps have in essence been designed for a narrow group of users, who do not represent the entire potential user base. The apps' functionalities and design should cater to a broader range of user needs and their focus should be shifted from period tracking to more comprehensive menstrual health tracking. A multidisciplinary perspective is required to account for the complexities of human states and conditions, while comprehending the complex synergies between humans and personally sensitive (i.e., health-related) mobile apps.

Furthermore, the findings of this study underpin a persistent failure to fully engage with issues pertaining to gender, the female reproductive system, and overall inclusivity in design. While here we acknowledge the diversity among groups of people connected to this physiology, ultimately the results reflect a global discourse that maintains a masculine-dominated status quo. We argue that this study and its findings are reflective of current discursive, operative and technological circumstances, forming the backbone of addressing health and wellbeing for the global population (i.e., refer to the Sustainable Development Goal 3, that subsequently impacts the other human-centered goals [46]). If health-related technological development still does not cater for all segments in WEIRD countries, there might be real concern for diverse segments in other parts of the world.

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References

[1] Teresa Almeida, Madeline Balaam, and Rob Comber. 2020. Woman-Centered Design through Humanity, Activism, and Inclusion. ACM Trans. Comput.-Hum. Interact. 27, 4 (August 2020), 1–30. https://doi.org/10.1145/3397176

[2] Ons Al-shamaileh, Alistair Sutcliffe, and Antonella De Angeli. 2011. The Effect of Religious Identity on User Judgment of Website Quality. In Human-Computer Interaction – INTERACT 2011 (Lecture Notes in Computer Science), 2011. Springer Berlin Heidelberg, Berlin, Heidelberg, 620–623. https://doi.org/10.1007/978-3-642-23768-3_97

[3] Bardzell, Shaowen. (2010, April). Feminist HCI: taking stock and outlining an agenda for design. In Proceedings of the SIGCHI conference on human factors in computing systems (pp. 1301-1310).

[4] Rosi Braidotti. 1997. Meta(l)morphoses. Theory, Culture & Society 14, 2 (May 1997), 67–80. https://doi.org/10.1177/026327697014002007

[5] Virginia Braun and Victoria Clarke. 2013. Successful qualitative research: a practical guide for beginners (First published ed.). SAGE, Los Angeles London New Delhi.

[6] Virginia Braun, Victoria Clarke, Elicia Boulton, Louise Davey, and Charlotte McEvoy. 2021. The online survey as a qualitative research tool. International Journal of Social Research Methodology 24, 6 (November 2021), 641–654. https://doi.org/10.1080/13645579.2020.1805550

[7] Francesca Bray. 2007. Gender and Technology. Annu. Rev. Anthropol. 36, 1 (September 2007), 37–53. https://doi.org/10.1146/annurev.anthro.36.081406.094328

[8] Richard A. Bretschneider. 2015. A Goal- and Context-Driven Approach in Mobile Period Tracking Applications. In Universal Access in Human-Computer Interaction. Access to Learning, Health and Well-Being, Margherita Antona and Constantine Stephanidis (eds.). Springer International Publishing, Cham, 279–287. https://doi.org/10.1007/978-3-319-20684-4_27

[9] Marika Cifor and Patricia Garcia. 2019. Inscribing Gender: A Duoethnographic Examination of Gendered Values and Practices in Fitness Tracker Design. January 08, 2019. . Retrieved September 10, 2024 from http://hdl.handle.net/10125/59652

[10] Pedro Costa and Luísa Ribas. 2019. AI becomes her: Discussing gender and artificial intelligence. Technoetic Arts 17, 1 (June 2019), 171–193. https://doi.org/10.1386/tear_00014_1

[11] Kimberle Crenshaw. 1989. Demarginalizing the intersection of race and sex: a black feminist critique of antidiscrimination doctrine, feminist theory and antiracist politics. (1989). Retrieved from https://www.google.com/url?q$=$https://chicagounbound.uchicago.edu/uclf/vol1989/iss1/8&sa$=$D&source$=$docs&ust$=$1726050806134649&usg$=$AOvVaw2Z4MShxok4kGd54L3Iu7zm

[12] Kimberle Crenshaw. 1991. Mapping the Margins: Intersectionality, Identity Politics, and Violence against Women of Color. Stanford Law Review 43, 6 (July 1991), 1241. https://doi.org/10.2307/1229039

[13] Kimberle Crenshaw. 2010. Close Encounters of Three Kinds: On Teaching Dominance Close Encounters of Three Kinds: On Teaching Dominance Feminism and Intersectionality Feminism and Intersectionality. (2010).

[14] T. De Lauretis. 1987. Technologies of Gender: Essays on Theory, Film, and Fiction. Indiana University Press.

[15] Daniel A. Epstein, Nicole B. Lee, Jennifer H. Kang, Elena Agapie, Jessica Schroeder, Laura R. Pina, James Fogarty, Julie A. Kientz, and Sean Munson. 2017. Examining Menstrual Tracking to Inform the Design of Personal Informatics Tools. In Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems, May 02, 2017. ACM, Denver Colorado USA, 6876–6888. https://doi.org/10.1145/3025453.3025635

[16] Jordan Eschler, Amanda Menking, Sarah Fox, and Uba Backonja. 2019. Defining Menstrual Literacy With the Aim of Evaluating Mobile Menstrual Tracking Applications. CIN: Computers, Informatics, Nursing 37, 12 (December 2019), 638–646. https://doi.org/10.1097/CIN.0000000000000559

[17] Caroline A Figueroa, Tiffany Luo, Adrian Aguilera, and Courtney R Lyles. 2021. The need for feminist intersectionality in digital health. The Lancet Digital Health 3, 8 (August 2021), e526–e533. https://doi.org/10.1016/S2589-7500(21)00118-7

[18] Emmalee A. Ford, Shaun D. Roman, Eileen A. McLaughlin, Emma L. Beckett, and Jessie M. Sutherland. 2020. The association between reproductive health smartphone applications and fertility knowledge of Australian women. BMC Women's Health 20, 1 (December 2020), 45. https://doi.org/10.1186/s12905-020-00912-y

[19] Sarah Fox and Daniel A. Epstein. 2020. Monitoring Menses: Design-Based Investigations of Menstrual Tracking Applications. In The Palgrave Handbook of Critical Menstruation Studies, Chris Bobel, Inga T. Winkler, Breanne Fahs, Katie Ann Hasson, Elizabeth Arveda Kissling and Tomi-Ann Roberts (eds.). Springer Singapore, Singapore, 733–750. https://doi.org/10.1007/978-981-15-0614-7_54

[20] Sarah Fox, Noura Howell, Richmond Wong, and Franchesca Spektor. 2019. Vivewell: Speculating Near-Future Menstrual Tracking through Current Data Practices. In Proceedings of the 2019 on Designing Interactive Systems Conference, June 18, 2019. ACM, San Diego CA USA, 541–552. https://doi.org/10.1145/3322276.3323695

[21] Katie Gambier-Ross, David J McLernon, and Heather M Morgan. 2018. A mixed methods exploratory study of women's relationships with and uses of fertility tracking apps. DIGITAL HEALTH 4, (January 2018), 205520761878507. https://doi.org/10.1177/2055207618785077

[22] Goncalves, A.; Prado, D., Silva, L. Frequency and experience in the use of menstrual cycle monitoring applications by Brazilian women.

[23] Liya T. Haile, Hanley M. Fultz, Rebecca G. Simmons, and Victoria Shelus. 2018. Market-testing a smartphone application for family planning: assessing potential of the CycleBeads app in seven countries through digital monitoring. mHealth 4, (July 2018), 27–27. https://doi.org/10.21037/mhealth.2018.06.07

[24] Tereza Hendl and Bianca Jansky. 2022. Tales of self-empowerment through digital health technologies: a closer look at 'Femtech.' Review of Social Economy 80, 1 (January 2022), 29–57. https://doi.org/10.1080/00346764.2021.2018027

[25] Joseph Henrich, Steven J. Heine, and Ara Norenzayan. 2010. The weirdest people in the world? Behav Brain Sci 33, 2–3 (June 2010), 61–83. https://doi.org/10.1017/S0140525X0999152X

[26] IQVIA Institute for Human Data Science. 2021. Digital Health Trends 2021: Innovation, Evidence, Regulation, and Adoption. Retrieved from https://www.iqvia.com/insights/the-iqvia-institute/reports-and-publications/reports/digital-health-trends-2021

[27] Vesa Jormanainen, Kimmo Parhiala, Anu Niemi, Marina Erhola, Ilmo Keskimäki, and Minna Kaila. 2019. Half of the Finnish population accessed their own data: comprehensive access to personal health information online is a corner-stone of digital revolution in Finnish health and social care. FinJeHeW 11, 4 (November 2019). https://doi.org/10.23996/fjhw.83323

[28] Siyeon Ko, Jisan Lee, Doyeon An, and Hyekyung Woo. 2023. Menstrual Tracking Mobile App Review by Consumers and Health Care Providers: Quality

Evaluations Study. JMIR Mhealth Uhealth 11, (March 2023), e40921. https://doi.org/10.2196/40921
[29] Neha Kumar, Naveena Karusala, Azra Ismail, and Anupriya Tuli. 2020. Taking the Long, Holistic, and Intersectional View to Women's Wellbeing. ACM Trans. Comput.-Hum. Interact. 27, 4 (August 2020), 1–32. https://doi.org/10.1145/3397159
[30] Johanna Levy and Nuria Romo-Avilés. 2019. "A good little tool to get to know yourself a bit better": a qualitative study on users' experiences of app-supported menstrual tracking in Europe. BMC Public Health 19, 1 (December 2019), 1213. https://doi.org/10.1186/s12889-019-7549-8
[31] Kathy Li, Iñigo Urteaga, Chris H. Wiggins, Anna Druet, Amanda Shea, Virginia J. Vitzthum, and Noémie Elhadad. 2020. Characterizing physiological and symptomatic variation in menstrual cycles using self-tracked mobile-health data. npj Digit. Med. 3, 1 (May 2020), 79. https://doi.org/10.1038/s41746-020-0269-8
[32] Georgianna E Lin, Elizabeth D Mynatt, and Neha Kumar. 2022. Investigating Culturally Responsive Design for Menstrual Tracking and Sharing Practices Among Individuals with Minimal Sexual Education. In CHI Conference on Human Factors in Computing Systems, April 29, 2022. ACM, New Orleans LA USA, 1–15. https://doi.org/10.1145/3491102.3501824
[33] Georgianna Lin, Pierre-William Lessard, Minh Ngoc Le, Brenna Li, Fanny Chevalier, Khai N. Truong, and Alex Mariakakis. 2024. Functional Design Requirements to Facilitate Menstrual Health Data Exploration. In Proceedings of the CHI Conference on Human Factors in Computing Systems, May 11, 2024. ACM, Honolulu HI USA, 1–15. https://doi.org/10.1145/3613904.3642282
[34] Deborah Lupton and Sarah Maslen. 2019. How Women Use Digital Technologies for Health: Qualitative Interview and Focus Group Study. J Med Internet Res 21, 1 (January 2019), e11481. https://doi.org/10.2196/11481
[35] Moira Maguire and Brid Delahunt. 2017. Doing a thematic analysis: A practical, step-by-step guide for learning and teaching scholars. All Ireland Journal of Higher Education 9, 3 (October 2017). Retrieved September 10, 2024 from https://ojs.aishe.org/index.php/aishe-j/article/view/335
[36] Michelle L. Moglia, Henry V. Nguyen, Kathy Chyjek, Katherine T. Chen, and Paula M. Castaño. 2016. Evaluation of Smartphone Menstrual Cycle Tracking Applications Using an Adapted APPLICATIONS Scoring System. Obstetrics & Gynecology 127, 6 (June 2016), 1153–1160. https://doi.org/10.1097/AOG.0000000000001444
[37] Riikka Murto. 2021. Gender categorisation in representational market practice. Journal of Marketing Management 37, 3–4 (February 2021), 238–265. https://doi.org/10.1080/0267257X.2020.1718181
[38] Tamara Peyton, Erika Poole, Madhu Reddy, Jennifer Kraschnewski, and Cynthia Chuang. 2014. "Every pregnancy is different": designing mHealth for the pregnancy ecology. In Proceedings of the 2014 conference on Designing interactive systems, June 21, 2014. ACM, Vancouver BC Canada, 577–586. https://doi.org/10.1145/2598510.2598572
[39] Adrienne Pichon, Kasey B Jackman, Inga T Winkler, Chris Bobel, and Noémie Elhadad. 2022. The messiness of the menstruator: assessing personas and functionalities of menstrual tracking apps. Journal of the American Medical Informatics Association 29, 2 (January 2022), 385–399. https://doi.org/10.1093/jamia/ocab212
[40] Donna Rosato. 2020. What Your Period Tracker App Knows About You. Retrieved February 4, 2024 from https://www.consumerreports.org/health/healthprivacy/what-your-period-tracker-app-knows-about-you-a8701683935/
[41] Frank Sullivan. 2001. What is health informatics? J Health Serv Res Policy 6, 4 (October 2001), 251–254. https://doi.org/10.1258/1355819011927468
[42] Helena Tokkonen and Pertti Saariluoma. 2013. How user experience is understood? In 2013 science and information conference, 2013. IEEE, 791–795. Retrieved September 10, 2024 from https://ieeexplore.ieee.org/abstract/document/6661831/
[43] Anupriya Tuli, Shaan Chopra, Neha Kumar, and Pushpendra Singh. 2018. Learning from and with Menstrupedia: Towards Menstrual Health Education in India. Proc. ACM Hum.-Comput. Interact. 2, CSCW (November 2018), 1–20. https://doi.org/10.1145/3274443
[44] Anupriya Tuli, Surbhi Singh, Rikita Narula, Neha Kumar, and Pushpendra Singh. 2022. Rethinking Menstrual Trackers Towards Period-Positive Ecologies. In CHI Conference on Human Factors in Computing Systems, April 29, 2022. ACM, New Orleans LA USA, 1–20. https://doi.org/10.1145/3491102.3517662
[45] Beatrice Tylstedt, Maria Normark, and Lina Eklund. 2023. Reimagining the cycle: interaction in self-tracking period apps and menstrual empowerment. Front. Comput. Sci. 5, (September 2023), 1166210. https://doi.org/10.3389/fcomp.2023.1166210
[46] United Nations. Department of Economic and Social Affairs. Sustainable Development. Retrieved May 9, 2024 from https://sdgs.un.org/goals
[47] Tuulikki Vehko. 2022. E-health and e-welfare of Finland: Check Point 2022. Finnish institute for health and welfare = Terveyden ja hyvinvoinnin laitos THL. Retrieved September 10, 2024 from https://www.julkari.fi/handle/10024/145973
[48] Kaisa Väänänen-Vainio-Mattila, Thomas Olsson, and Jonna Häkkilä. 2015. Towards Deeper Understanding of User Experience with Ubiquitous Computing Systems: Systematic Literature Review and Design Framework. In Human-Computer Interaction – INTERACT 2015 (Lecture Notes in Computer Science), 2015. Springer International Publishing, Cham, 384–401. https://doi.org/10.1007/978-3-319-22698-9_26

A APPENDICES

A.1 Questionnaire

Screening question: I meet one of the following conditions for participating in the study:

A1: I currently use a menstrual tracking app regularly and am not satisfied with the app I use.

A2: I stopped using a menstrual tracking app regularly within the last three years and was not satisfied with the app when I used it.

A3: I have not used a menstrual tracking app. I would like to use one, but I am not satisfied with the available options.

Table 5: Questions in the questionnaire

	Answer to the screening question	A1	A2	A3
1	Why do/did you use or would you like to use a menstrual tracking app?	x	x	x
	Tracking cycle length			
	Tracking menstrual flow			
	Tracking mood			
	Tracking PMS symptoms			
	Tracking menstrual pain			
	Tracking physical changes (e.g., bloating, sleep, skin)			
	Collecting information for a doctor/nurse			
	Collecting information for a partner or other close person			
	Preparing for the next period			
	Trying to conceive			
	Avoiding pregnancy			
2	Justify, elaborate or add if you wish.	x	x	x
3	What kind of goals did/do you have that using a menstrual tracking app has helped or could help you achieve?	x	x	x
4	Why did you stop using the app?		x	
5	Why are you not satisfied with the available menstrual tracking apps?			x
6	Did/does using the app support achieving these goals?	x	x	
7	Were/are you satisfied with the app's features? (Yes / No)	x	x	
8	What changes or additions would you like to see in the app's features?	x	x	
9	Were/are you satisfied with the app's appearance? (Yes / No)	x	x	
10	What changes or additions would you like to see in the app's appearance?	x	x	
11	Are there any other factors that reduce the pleasantness of using the app?			x
12	Could changes made to the app make you start using it? If yes, which ones?		x	x
13	Would you like the menstrual tracking app to be linkable to a device (e.g., smartwatch, smart ring, thermometer)? (Yes / No)	x	x	x
14	To which smart device would you like to link the app, and how would you like to benefit from the connection?	x	x	x
15	Do you pay for the menstrual tracking app you use?	x	x	
16	How much do you pay / would you be willing to pay for a good menstrual tracking app?	x	x	x
17	Free word about menstrual tracking apps and their use	x	x	x
18	Gender	x	x	x
19	Age	x	x	x
20	Menstrual regularity	x	x	x