

It Takes Two to Avoid Pregnancy: Addressing Conflicting Perceptions of Birth Control Pill Responsibility in Romantic Relationships

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While birth control pills are one of the most common forms of contraception, their usage has several emotional and physical costs, such as taking the pill daily and experiencing hormonal side effects. The burden of these tasks in relationships generally falls on the pill user with minimal involvement from their partner. In this study, we conducted semi-structured interviews with pill users and their partners to investigate the differences between their perceived current and ideal divisions of birth control responsibility. During the interview, we presented a collaborative birth control tracking app prototype to examine how such technology can overcome these discrepancies. We found that pill users were unsatisfied with their partners' engagement in contraceptive tasks but did not communicate this well. Meanwhile, partners wanted to contribute more to pregnancy prevention but did not know how. When presented with our app prototype, users and partners stated that our design could address these issues by improving communication between users and partners. In particular, users appreciated how technology could increase engagement and support from their partner, and partners liked that our app presented several concrete ways to become more involved and show emotional support. However, privacy issues exist given the sensitive nature of contraception. We highlight design considerations that should be kept in mind about privacy while recognizing pill users' efforts and promoting partners' involvement.

CCS Concepts: • **Human-centered computing** → **Empirical studies in collaborative and social computing**.

Additional Key Words and Phrases: Women's health, birth control, romantic relationships, collaborative technology

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1 INTRODUCTION

Beginning with its FDA approval in 1960, the oral contraceptive pill, or simply "the pill," has proven to be one of the most transformative medications ever developed. Only two years after its introduction, 1.2 million people in America were taking the pill, and it is estimated that as of 2020, 300 million people around the world have taken the medication as well [33]. The lasting impact of the

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pill is the agency it gives to users over their own reproductive health, thus allowing them to better plan the number and timing of pregnancies around their life choices and professional careers [41]. The pill reduced the need for its users¹ to rely on their partners using condoms or other forms of contraception like a diaphragm and increased their control of their own fertility [61]. However, there is evidence that this shift in control of fertility created an imbalance in the responsibility of contraception, as a study examining gender roles with heterosexual men and women found that men typically rely on their partners for birth control and engage little with the process [57]. 61.7% of women in the United States between the ages of 15 and 44 used contraception between 2011 and 2013, and the pill was the most common method for that age group [19]. However, even with the high percentages of pill usage, there is little research exploring technologies that support fertility control and the pill user's sexual health experience. Currently, research in HCI that addresses fertility and menstruation is primarily focused on maternal care and pregnancy planning rather than pregnancy prevention [1]. Our research contributes to the under-researched area of fertility tracking for the use of contraception and investigates how to engage romantic partners in mutual collaboration of this process.

A study conducted in 2014 revealed that women felt that they bear the burden of sexual health and fertility tracking, although their partners felt that the responsibility should be shared in a romantic relationship. Despite men's reported willingness to engage with the contraceptive process, the responsibility is rarely shared between romantic couples [23]. This gap is likely due to the lack of communication around the topic of contraception. For example, a study investigating communication between romantic partners regarding contraception found that couples had difficulty talking about the stigmatized topic of safe sexual practices [13], so the subject is often avoided entirely. Researchers have found that collaborative technology that enabled information sharing between romantic couples could increase context, communication, and collaboration [26, 28, 49]. Further, technology designed for couples to collaborate on common tasks has been shown to increase empathy and thus promote feelings of accountability [43]. Therefore, our research goal is to investigate how collaborative technology that enables information sharing on birth control pill usage can address the communication gaps of contraceptive responsibility in romantic relationships. Specifically, we aim to uncover the differing perspectives on contraception responsibility between users and partners, and how collaborative technology can be designed to foster social support from partners.

In our study, we interviewed nine separate couples and had them fill out a survey querying about current and ideal contraceptive responsibility distributions in their relationship. We found that, consistent with current literature [10, 11], pill users felt they were almost entirely responsible for pregnancy prevention, and while partners also believed that users held more responsibility than them, they thought that responsibility was much more equally distributed than what users thought. We found that collaborative technology such as our app prototype can increase communication and engagement from the pill partner as well as provide opportunities for pill users to be emotionally supported when dealing with the burden of pregnancy prevention. Overall, our research contributes to the space of supporting contraceptive users and their sexual health behaviors by (1) uncovering perceptions and expectations of responsibilities of birth control usage between romantic partners, (2) investigating the potential benefits and challenges of using a shared tracking system, and (3) suggesting design implications for systems that provide a platform for tracking, social support, and sharing responsibility of contraceptive methods between romantic partners.

¹When referring to existing literature and established fields such as "Women's Health", we will mirror the use of gendered terminology such as "women" and "men" if they are present in the referenced works. However, in our own study, we will be using gender-neutral terms of "pill user" and "pill partner" and encourage readers to recognize that contraceptive users' gender identities vary.

2 RELATED WORK

Tracking personal health data is a routine activity that is increasingly of interest to the general population, as seven out of every ten U.S. adults track at least one health indicator for themselves or a loved one [25]. However, research and development efforts are lacking when it comes to technologies that are designed to track women's health specifically [1] and lacking even more so in technologies designed for information sharing in intimate relationships [43]. Our work focuses on both of these concepts: designing an effective women's health tracking technology, and how that technology can support the needs of partners in romantic relationships. We contribute to the HCI research space of women's health by utilizing the human-centered design process to investigate a fertility tracking tool that effectively meets their needs, as both digital and non-digital options currently available are lacking [22, 58].

2.1 Tracking Women's Health

"Women's Health" is a discipline that "focuses on diseases or conditions that are unique to [female bodies], or that affect both [sexes] but where there may be sex and gender differences that are particularly important to [females] [29]." Compared to other domains of health, women's health tracking has seen a lack of attention. For example, popular native health applications on mobile devices first launched with no integration of women's specific metrics, causing some unrest within the women's health community [22]. The lack of effective technologies that support women's health is due to multiple factors, such as little research and development as a result of body taboo associated with intimate care surrounding hidden parts of the body that are linked to sexual functioning (e.g., inserting an intrauterine device) [1, 59, 60], and systems not meeting specific user needs such as birth control tracking apps that fail to remind the users to take their pill [58].

According to a study by Epstein et al. [22], women typically track their menstrual and fertility health for the following reasons: to be aware of how their body is doing, to understand their body's reactions to different phases of their cycle, to become pregnant, and to inform conversations with healthcare providers. To accomplish these tracking goals, they use a wide range of tools. Some choose traditional methods, such as writing in paper notes or diaries, or noticing their physical symptoms when they are in their menstrual cycle. Furthermore, technology plays a bigger role in self-tracking and analyzing health data [14, 15, 37, 50] and encouraging support groups with friends, family, and healthcare providers [21, 36]. In particular, mobile phones and general access to the internet provide women with easily accessible educational resources on women's health such as fertility and maternal health [15, 37], and self-tracking technology like the Memory Stone [21] creates opportunities for users to gather large amounts of personal data to effectively collaborate with health care providers [14]. Additionally, fertility tracking often extends past the physical act of logging information into an app, such as the interactions between romantic partners and healthcare providers [15].

Recent literature has reported that nearly 50% of women track their menstrual cycle using digital solutions such as phone applications and digital calendars [22], and by 2016, the total downloads of menstrual tracking applications was estimated at 200 million. The primary function of menstrual tracking applications is to log data about menstrual cycles to visualize, analyze, and predict the menstrual period [39, 51]. For example, applications such as Easy Period Calendar and Flo are cited as helping their users track irregular periods and understand when bleeding will start [51]. Users of fertility apps often track their data to gain a sense of control over the fertility process and to understand their physiological state better [17] as well as to help them navigate many life changes to their fertility goals [16].

However, many of these solutions fall short of supporting their users' needs. For example, users of menstrual tracking apps that predict cycle length or symptoms, such as My Cycle and Period Tracker, report that apps do not take into account any environmental or outside influence on the users' body [22]. Privacy issues are also a concern for users. For example, some people who track their menstrual cycle would prefer to minimize sharing information about it and purposely pick app designs that are more discreet [22]. Users also note how apps do not provide much help in interpreting self-tracked data, as common visualizations like calendars do not suffice for understanding any underlying health trends [16, 17]. Fertility apps are often limited in scope; for example, a study from Andalibi found that 72% of fertility apps did not address the common complication of pregnancy loss [2]. Additionally, many of the digital reminder methods for time-sensitive birth control fail to effectively address forgetfulness. Forgetfulness is the main cause of non-conformance in time-sensitive contraception method like the pill, and failing to use the medication correctly results in over 1 million unintentional pregnancies per year [58]. Our research aims to address these shortcomings by contributing informed design suggestions for women's health technologies that more directly target the tracking needs of people using time-based contraceptives such as the pill.

2.2 Contraceptive Use in Romantic Partnerships

In addition to the limited research on effective technologies for women's health tracking, little research has investigated social support for women's health, specifically how technology can facilitate that support from romantic partners. When discussing topics such as menstruation and birth control, there is an imbalance in perceived contraceptive responsibility due to gender roles. Responsibility for sexual health is disproportionately attributed to women, leading women to feel that contraception responsibility unquestioningly falls entirely onto them [10], while men's sexual practices and attitudes are rarely questioned or challenged by partners and society [23]. For example, if their partner was taking hormonal birth control, male partners were very reluctant to use or suggest secondary contraception such as condoms and overall thought the primary responsibility of contraception fell on the female partner.

This creates a paradox in women's sexual health. In one study, men adhered to the assumption of contraception being owned by women and tended to rely on women to take full responsibility for contraceptive methods, yet unintended pregnancy was found to be the main source of sexual anxiety amongst men [57]. However, only 25% of men use secondary contraception like condoms when their partner is using birth control pills [53]. Studies have demonstrated that factors such as trusting their partner or their partner using a highly effective contraception method such as the pill can decrease a man's perceived risk of pregnancy, thus also decreasing the feeling of responsibility for birth control [23, 57]. However, an online study that surveyed 326 women reported that 89.1% of women felt that contraceptive responsibility should be shared between romantic partners, but only about 50% of these women felt that this responsibility was actually shared [11]. A possible reason for the discrepancy is that both young men and women have difficulty talking about the stigmatized topic of safe sexual practices [13]. The same study found that only half of all sexual encounters between young adults were preceded with a discussion of contraception, with most of these conversations taking place immediately before intimacy. Our research addresses this imbalance in contraceptive responsibility between romantic partners by exploring how a shared tracking technology can facilitate communication, support, and engagement.

2.3 Digital Information Sharing for Social Support

Romantic partners often work together for emotional support, citing increasing awareness, visibility and motivation as common reasons for collaboration in their relationships [28]. A study by Cutrona

and Suhr also found that for married couples, spouses are often the first people consulted during highly stressful events; additionally, when a partner approached their spouse for help, over 90% of the spouses responded with informational and emotional support [18]. There have been efforts to translate this social support into technological designs for couples [40]. CoupleVIBE, a mobile application intended to increase communication and connection between long-distance couples by providing passive location data, demonstrated how a shared data system can fill contextual gaps in relationships and offer a richer understanding of romantic partners [5]. Couple-centered technologies such as a Diary Built for Two improve romantic communication by fostering joint reflection and mutual information sharing between couples [8]. Couples are also more likely to share more online accounts with sensitive and private information such as bank and e-commerce accounts as their relationship progresses, which is indicative of growing trust and comfort [43]. Outside the sphere of couple-related technology, research has shown that social support and communication has other positive effects. For example, increased awareness in the social circles of terminally ill patients has been shown to extend the lifespans of the patients [45]. People with other conditions, such as dementia [32] and depression [4], also garnered more support when they visited online forums or talked about it openly on social media. However, little is known how social and collaborative technology influences the interactions between couples seeking contraception support. We draw on the aforementioned research supporting shared digital information for increased engagement in relationships and related tasks to explore the potentials for a shared information technology that evens the gap between perceived responsibility and contraceptive support between romantic partners. The following study was conducted with the hopes of answering this question.

3 METHODOLOGY

3.1 Participant Recruitment and Information

To examine the concept of shared tracking for couples and its impact on collaborative efforts of birth control responsibility, we conducted semi-structured interviews with nine couples for a total of 18 participants (Table 1). Our inclusion criteria of participants were those aged 18 or older using birth control pills while in a relationship. Based on a 2016 survey of contraceptive use within the United States, users of birth control pills tend to skew young comparative to the rest of reproductive-aged people [34]. Percentages of pill usage peak within the 15 to 19 year range, with 44.7% of this demographic using the pill, and this number is more than halved by the 30 to 34 year range, where usage stands at 19.3%. Given the prevalence of younger pill users, we decided that our target demographic were couples where the pill user was aged between 18 and 30 years old. Based on previous literature, we adopted purposive sampling [6, 54]. We specifically recruited for the people in the aforementioned target demographic. We recruited participants via University mailing lists and Reddit subreddits related to women's health and contraception (e.g. r/TwoXChromosomes, r/sex). When recruiting participants, since we were looking to interview both the pill user and pill partner for each relationship, we asked people to fill out a sign-up survey where we asked people to sign up and list contact information for both themselves and their partner; we only interviewed couples if we received consent from both participants in the relationship to be interviewed. Interviews for a single relationship were conducted separately (i.e. one distinct interview with the pill user and one distinct interview with the pill partner) but within the span of three days of each other. Following previous work on sampling romantic couples [24, 46, 48], we continued interviews until we had reached "data saturation", the point where no new information would be obtained from further interviews. Most of the couples we interviewed had very similar responses to our interview questions, so we concluded that we had reached data saturation at 18 participants and concluded our interviews at that point. Participants' ages ranged from 20 to 27

Table 1. Participants Demographics

Relationship ID	Role	Gender	Age	Couple Information
R1	partner	male	20	dating for 4 years; met in high school
	user	female	20	started pills 2 years into relationship
R2	partner	male	27	dating for 3 years
	user	female	25	started pills 3 years into relationship
R3	partner	male	21	dating for a year
	user	female	21	started pills 2 years before relationship
R4	partner	male	20	dating for 2 years
	user	female	20	started pills 5 years before relationship
R5	partner	male	22	dating for 7 months
	user	female	21	started pills 3 years ago in a previous relationship
R6	partner	male	22	dating for 5 months
	user	female	21	started pills 3 years ago to regulate her period
R7	partner	male	20	dating for a year
	user	female	21	started pills 6 years ago to regulate her period
R8	partner	male	22	dating for a year and a half
	user	female	20	started pills 2 years ago following an abortion
R9	partner	non-binary	27	dating for six months
	user	non-binary	26	started pills 4 years before relationship

(average = 22 years, SD = 2.47) and they were either university students or employed. None of the participants were married or engaged. While the average age of the interviewed couples was on the lower side of our target demographic (age 18 to 30), we found that the responses from the two couples aged 25 years and older (R2 and R9) did not significantly deviate from the responses of the younger participants.

3.2 Study Procedure

Our study consisted of separately interviewing both the pill user and the pill partner of a relationship (meaning one person was interviewed at a time). In this interview, participants first filled out a short survey lasting about five minutes, which asked about their and their partner's roles concerning contraceptive responsibility in their relationship. For the rest of the time, we conducted a semi-structured interview to further uncover their experiences and discuss how collaborative technology could be designed to address the issues of contraceptive engagement between pill users and partners. During the second half of the semi-structured portion, we showed participants prototype designs of a birth control pill tracking app that would be shared between both the pill user and partner. Participants were interviewed for about 50 minutes on average, with the longest interview taking about 75 minutes. We conducted our study both in-person and online. All of the conducted interviews were audio-recorded upon the participant's consent. Below, we go into detail about specific aspects of the interview process.

3.2.1 Survey. To understand how our participants differently perceive and expect each other's responsibility in current birth control pill usage, we asked them to complete a survey asking about their and their partner's current and ideal responsibility in birth control pill contraception. We first asked participants to rate on a scale of 1 to 10 how four pill-taking tasks **were currently divided** between the pill taker and the partner, with 1 being the partner's responsibility and 10 being the pill taker's responsibility. The four tasks were: (1) taking the pill on time every day, (2) understanding what to do in case of a missed pill, (3) dealing with side effects, and (4) purchasing

pill refills. We came up with these four tasks based on previous studies that investigated common challenges of birth control pill usage. The first two tasks were motivated by a study which revealed that pill users dislike having to remember to take a pill every day and being exposed to the risk of experiencing side effects [27]. The third task discussed missed pills because a majority of pill users report having missed at least one pill [56]. Lastly, we included the task of obtaining a pill refill because many pill users encounter difficulties with prescription or refill access [10], and we believed that it was one of the activities that partners could practically support. The survey then asked participants the same questions as above, but asked them to rate they believed each task should **be ideally divided**. The survey results are reported in Table 2.

3.2.2 Semi-structured Interview. The interviews were conducted to investigate how sharing information related to birth control pill usage between romantic partners can address the differing perception of birth control pill responsibility. During the interviews, we first asked participants questions on the background of their relationships, their birth control pill use, and their roles in contraception responsibilities. For example, we asked how pill users and their partner typically communicate about contraception and what support pill users mostly need when they are using birth control pills.

In the second half of the semi-structured interview, we showed participants a prototype design (Figure 1) of a mobile app that shares pill information between user and partner. We aimed to uncover how such technology would influence the couples' engagement, perceived responsibility, and communication around contraception practices, and asked about any challenges they expected to see when using the technology. For example, while showing the pill and risk tracking sharing features (Figure 1-a), we asked whether this feature would make a difference in the way they kept track of pill intakes (especially of missed pills), and to elaborate if and how they would use the risk tracking feature to communicate with their partner about potential pregnancy risks. Additionally, we asked the pill takers how they would feel about sharing their information on pill intake with their partner. For the pill refill feature (Figure 1-b), participants were asked how this feature would affect their behaviors if a refill date was approaching. Finally, for the user-partner communication feature (Figure 1-c), we asked how this form of communication would impact their communication practices about birth control. We go into further detail about the prototype design in the following subsection.

3.3 App Prototype Designs

To understand how technology can better support both pill user and partner to engage in contraceptive practices of using birth control pills, we created a prototype that allows pill users to share birth control pill tracking practice with their partners. The prototype was designed to focus on three activities that can be shared with partners: pill and risk tracking, pill refills, and pill user-partner communication. We added the pill and risk tracking features (Figure 1-a) and the pill refill reminder feature (Figure 1-b) because they were the most commonly included and used features in some of the most reviewed birth control pill reminder apps on the Apple App Store and Google Play Store. The existing apps included Birth Control Pill Reminder [42], myPill Birth Control Reminder [44], BC Pill Reminder [38], and Emme: Pill & Health Tracker [20]. All of these apps had a pill intake tracking feature and a refill reminder feature, and myPill Birth Control Reminder and BC Pill Reminder showed whether the pill user was considered "Protected" based on their pill logging history. However, these apps did not have features that allowed users to share these activities with their romantic partner. Therefore, we made our prototype's features shareable between the pill user and the partner to investigate how sharing information would impact their engagement in contraception. Moreover, we added the user-partner chat feature (Figure 1-c) to understand

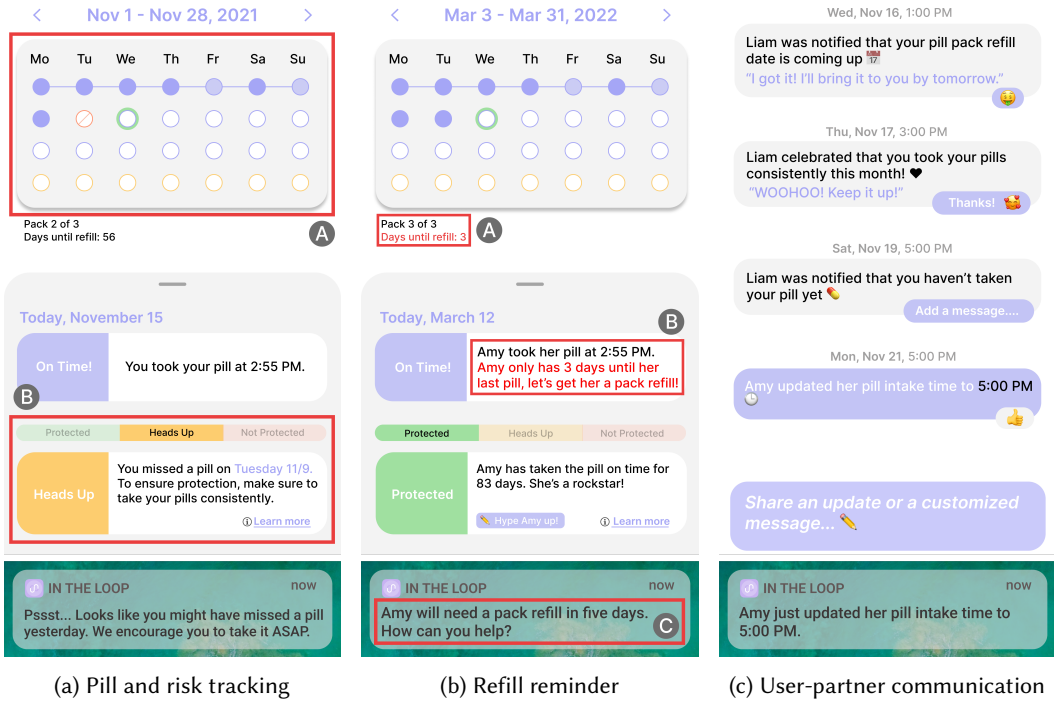


Fig. 1. Shared birth control pill tracking app prototype: (a) a pill tracking interface to log daily pill intake and a risk level tracker that evaluates pregnancy risk based on pill logging history, (b) refill reminder feature, and (c) user-partner messaging screen where the pill user and the partner receive important updates and send their customized messages

how synchronizing information and encouraging communication would promote empathy and motivation to be involved in birth control.

3.3.1 Pill and Risk Tracking Shared by User and Partner. In our prototype, the pill tracking interface was displayed as a diagram of a typical pill pack in the landing page (Figure 1-a-A). Each circle was marked in full color if the pill user takes a pill on time, in translucent color if taken early or late, or /modified with a red "X" if the pill was missed. Furthermore, we presented risk level estimation into three categories: (1) "Protected", (2) "Heads Up", and (3) "Not Protected" (Figure 1-a-B). The app estimated the risk of pregnancy based on the number of missed pills marked in the app. If the users were in the "Heads Up" or "Not Protected" categories, the app alerted them accordingly with a "Learn More" button, which led to an external medical website that advised them on what to do in the situation. These informational features were inspired by existing birth control pill tracking apps that provided their users educational access. For example, myPill Birth Control Reminder [44] evaluated the user's risk of pregnancy after asking them a set of medical questions and provided a link to an external medical website for more information, and Emme: Pill & Health Tracker [20] advised its users their next steps if they missed a pill and had a blog tab of educational articles related to birth control pills and women's health.

3.3.2 Pill Refills Shared by User and Partner. The refill date reminder feature was included to alert pill users and partners for upcoming refill dates (Figure 1-b-A and 1-b-B). When the pill user's refill date was coming up, the app alerted both the user and the partner through a notification

(Figure 1-b-C) and status messages in the landing page. Specifically, the texts under the pill pack diagram (Figure 1-b-A) and in the "Today" status box (Figure 1-b-B) would update the couple with the number of maximum days left to obtain the refill (Figure 1-b-B).

3.3.3 User and Partner Communication. The user-partner chat screen was designed to understand the impact of communication and synchronized understanding on efforts of working together towards achieving effective birth control (Figure 1-c). It automatically notified the app users of important updates, such as pill refill notifications and changes in pill intake time. Moreover, the app allowed the pill user and the partner to add customized messages along with the automated notifications. For example, in our app prototype, Liam encouraged Amy with the words "Keep it up!" when he was notified that Amy took her pills consistently for the month.

3.4 Data Analysis

We report our survey data analysis process along with the survey results in Section 5.1. To analyze our interview data, we first transcribed all the interview audio recordings. Three researchers individually read the interview transcripts and conducted open coding with thematic analysis [9, 30]. Then, the entire research team came together to discuss the codes to find patterns and address discrepancies. In order to answer our research goal of understanding how and why romantic partners differently perceive and expect each other's responsibility in birth control pill usage, we evaluated and categorized participants' perspectives. For example, we reviewed the interview transcripts while comparing both responses of pill users and partners to detect discrepancies and any inferences of expectations related to contraception, either of oneself or of their partner. To meet our second goal of investigating how sharing information related to birth control pill usage can help couples overcome existing discrepancies, we analyzed participants' reactions to each of the features in our app prototype and compared them to their previous descriptions of responsibility distribution. The resulting themes are reported in the results section.

4 RESULTS

In our study, we found that pill users wanted more involvement from their partners but did not convey that message clearly to the partners. Additionally, pill partners did not talk about or get involved with the pill taking process, since they assumed the pill users already had it under control. During our interviews, we uncovered that this discrepancy is due to the lack of information sharing around the topic of contraception. Furthermore, discussions about our app prototype revealed that a shared source of information between partners could bridge this gap.

In this section, we first report the participants' survey results. From these results, we confirm that discrepancies exist when comparing pill users' and partners' perceptions of how contraceptive responsibility both currently is shared and how it ideally should be shared. Based on the answers provided in the subsequent interview portion, we find that there are three major reasons for these discrepancies. First, pill partners underestimated the effort of taking birth control pills; second, pill users had trouble communicating relevant information with their partner, so partners did not know how or when to support the user; and third, partners refrained from frequent involvement to avoid appearing patronizing or distrusting of their partner. We illustrate how using collaborative technology to share birth control usage information between couples, such as via our app prototype, addresses each of these three problems. In the following sections, we will use the term "user" or "pill user" to refer to the person in the relationship who intakes the contraceptive pill, while "partner" or "pill partner" refers to the person in the relationship who does not take the pill.

Table 2. Average Scores of Survey Responses.
Scores range from -5 (completely partners' responsibility) to +5 (completely users' responsibility).

		Practical Tasks		Support Tasks		Average of all tasks
		Taking the pill every day	Handling pill refills	Dealing with side effects	Knowing steps after missed pill	
Current	Reported by users	4	4.1	3.3	3.5	3.725
	Reported by partners	2.9	2.9	2.1	1.1	2.25
Ideal	Reported by users	1.6	1.1	0.9	0.7	1.075
	Reported by partners	0.7	-0.9	0.2	-0.1	-0.025

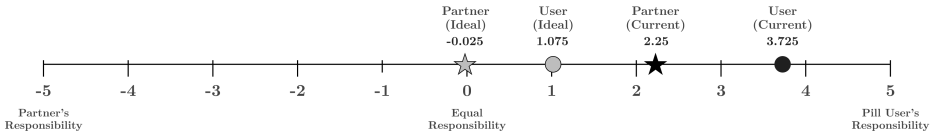


Fig. 2. Average Survey Scores for all tasks. Partners (star icon) tend to underestimate the effort of users (circle icon), in both current (black color) and ideal (gray color) scenarios.

4.1 Discrepancies of Shared Contraceptive Responsibility

Table 2 shows the averaged results of the survey. We have adjusted the scores from the scale of 0 to 10 to a scale of -5 to 5. On the new scale, 0 indicates equal responsibility, and a positive or negative number indicates more responsibility towards the user or partner, respectively (Table 2 and Figure 2). We then aggregated the survey results from all 18 participants and averaged the results between the partner and user groups. We looked for trends across three variables: between user and partner, between current and ideal responsibility, and between the four tasks listed on the survey.

To assist in interpretation of our survey results, we visualized the users' and the partners' averaged responsibility scores across all four tasks in Figure 2. As shown in Figure 2, partners tended to underestimate the users' contributions—the average score of perceived current responsibility was 3.725 out of 5 (towards the user's side) when reported by the users themselves, while it was 2.25 out of 5 when reported by the partners. The largest discrepancy was found in the task of knowing what to do in case of a missed pill. Partners reported an average score that was 2.4 points lower than the users' score, indicating that partners believed that the responsibility of handling a missed pill was fairly equal in the status quo. Despite this underestimation, partners still believed there was more they could do to engage, as their averaged score for ideal responsibility was 2.275 points lower than their averaged score for current responsibility.

We can categorize these four survey tasks into two categories—practical tasks, which include taking the pill every day and handling pill refills, and support tasks, which include dealing with side effects from the pill and knowing what to do in case of a missed pill. Pill partners generally believed that current responsibility in practical tasks fell mostly on the user with an average score of 2.9, while the average score of current responsibility in support tasks was more equal with an average score of 1.6. The difference between these two scores was statistically significant, with a p-value of 0.014 via the Mann-Whitney U Test [47]². However, this difference was less noticeable for users, as both practical and support tasks were positioned squarely on the pill user's side (See Table 2). From these findings, we hypothesized that while partners and users agreed that current responsibility for practical pill tasks mostly fell on the user, partners believed that responsibility of support tasks was much more equal than what users reported.

²We used the Mann-Whitney U Test as we cannot assume a normal distribution for partner scores.

When looking at what partners and users reported as ideal responsibility splits, the trend continued that partners' reported scores were lower than users' scores, indicating that partners believed they should ideally carry more responsibility. Partners reported an average score of -0.025 and users reported an average score of 1.075, where 0 indicates completely equal responsibility and a negative number means that the pill partner should carry more of the responsibility. Therefore, a discrepancy still existed even in the ideal case, as partners believed that responsibility should tend towards equal responsibility more than the users did. However, participants remarked that not all tasks carry the same importance in the birth control pill process, with users stating that taking the pill on time every day was far more relevant than the other three tasks. For the most part, both users and partners agreed that responsibility should tend towards completely equal across all tasks. An interesting outlier was that partners gave the task of handling pill refills an ideal score of -0.9, indicating that partners felt they should actually be more responsible than the pill user in getting refills. Here was one partner's reasoning for this:

R1-partner: "At least it [helping with pill refills] is something that I can actually have an impact in. This is one of the only ways that I can really help. [...] There's certain things that are out of my control, so I want to make sure I do the most in the ones I actually do have control in."

Many partners felt that they could have the most impact in practical areas of the pill process. Partners' average score of ideal responsibility for practical tasks was 3 points lower than that of ideal responsibility (meaning that partners should share more responsibility for practical tasks), while there was a decrease of only 1.55 points for support tasks. The delta between these scores was significant at the p-value of 0.035 via Mann-Whitney U Test, so it was safe to conclude that partners believed they could ideally become much more responsible for practical tasks, but not much more for support tasks. Meanwhile, users' reported differences between current and ideal responsibility were relatively similar across all four tasks. Overall, these discrepancies between pill users and partners indicate that partners tended to underestimate the users' contributions when compared to pill users' perceptions, and that partners focused much more on practical pill tasks than support tasks.

4.2 Reasons for Responsibility Discrepancy

Despite what the partners reported in the survey, we found that for most couples, engagement from the pill partner was minimal. Partners generally stated they were satisfied with this arrangement and were under the assumption that the pill users were as well. However, most users stated that they would appreciate additional involvement from their partner. To answer the question of why contraception responsibility is differently perceived among couples, we report three reasons that explain partners' lack of involvement.

4.2.1 Partners' underestimation about pill taking efforts. Given the nature of the pill, users had to think about their role in contraception every day because they have to take the pill every day. Pill users stressed the importance of how both parties in a relationship needed to think about contraception responsibility. Users often stated how the taking the pill always had to be in the back of their mind, given the potential consequences of missing them. As one user stated:

R7-user: "[I took birth control pills] for six years straight at 9 o'clock in the morning. I took my pill. It got so ingrained that even when I stopped taking my pill, I still woke up at 9 without the alarm. When I would pack, I would always have to think about bringing my pills. It's a whole schedule. My life revolved around every morning, taking this stupid birth control pill."

While R7-user was one of the more frustrated users regarding pill intake, many users resonated with the idea that while taking the pill every day might seem like a trivial task on the surface, it was still logistically something that they had to think about every day. Additionally, given how important pregnancy prevention is to these couples, there was a layer of anxiety that often came with preparing for pill taking. This led to a dichotomy between the pill user and partner, where the pill user had to deal with the pill in a very regimented fashion while the pill partner only thought about it at arbitrary times just as a means of reassurance:

R4-user: "I make a conscious effort every day to put in the work to make sure that I don't get pregnant, and it'd be nice if my partner also made that conscious decision every day. My partner doesn't think about it every day since he doesn't really need to."

In fact, most partners overall believed that taking the pill was a simple task that did not need any collaboration between partners. Partners recognized that the pill was definitely a burden, especially with hormonal side effects, and several partners stated that they would be open to taking the male birth control pill if it was widely available. Despite this, the partners believed there was no need to talk with the pill users about the actual act of taking the pill given the seeming triviality of the task.

R8-partner: "I feel like taking it [the pill] is just something that doesn't need emotional support. For example, I take a daily allergy pill, and I've taken it so long it's just something I do, there's nothing else added to it. So unless I've misunderstood something, I think that's also the view of taking the birth control pill—like there's nothing special with it, just take it every day."

Most partners believed that taking the pill was just a slight inconvenience. While they recognized the unfairness of that burden primarily falling on the user, they believed overall that taking the pill was not a big deal and there was no reason to talk about it. Several partners emphasized the plain mundanity of taking the pill and that it just was not something that needed to be talked about, as they know it had just become a part of the users' daily regimen:

"R9-partner: With previous partners, it's just gotten to a point in our relationship where taking the pill is just kind of a mundane thing. It's not ideal, but we're both comfortable with this reality and asking her excessively just feels a little saccharine or even congratulatory to the point of condescending—it's like, 'Yay, you did the thing that you do every day!' [...] There are plenty of things that you just stop talking about in a relationship, it's like talking about brushing your teeth."

When contrasting the different reactions from user to partner, we found that partners generally failed to consider the potential anxiety and pressure of dealing with a topic as serious as contraception. Partners tended to be less concerned about the emotional influence of taking the pill and focused on the practical aspect of pill taking, where they concluded that the task was not taxing enough to warrant involvement.

4.2.2 Lack of communication and knowledge about what partners can do. All of our couples have discussed contraception with their partner, usually in the form of a lengthy discussion near the beginning of their relationship. However, once the pill user had established that they were taking birth control pills, most partners did not really discuss the matter further unless prompted by the pill user. For the most part, subsequent communication was limited to the partner occasionally checking in and asking if the user has taken their pill for the day. While the partners were grateful to the pill user for taking the pill, most partners did not go out of their way to become involved in the process. This mostly stemmed from the belief that there really is not much that the pill partner could do to actually help out:

R8-partner: "As far as responsibility goes, there's pretty much none on my end, and even if I wanted more responsibility, there's not a lot I can do."

Given the partners' practical viewpoint of the pill, partners believed if the user was taking the pill consistently, then there was no reason for the partner to get involved. Most partners concluded that the best course of action was to stay out of the user's way to avoid being a hindrance. While the general perception for pill partners was that engagement on their end was unnecessary, most of the pill users we interviewed had different opinions. A common trend for pill users was that engagement from their partner showed active involvement in dealing with contraception responsibility, which users appreciated:

R2-user: "My partner supporting me, being on the lookout and helping out when to take my pills is important to me. This makes us connected, and it makes me feel better. It shows he's concerned about it too and that he's involved in the whole situation, so that makes it a lot more bearable."

Partners were generally unaware that the users wanted support from them, which also contributed to their ambivalence of getting involved. As shown in the survey results, partners thought that practical help was how they could contribute the most and that emotional support would not really be useful to the pill user. To that end, partners did not really know how to help since they could not take the pill for the user. However, users remarked that emotional support was actually the area that partners could contribute the most, and that while reminders might seem trivial, they were appreciated:

R8-user: "I wish I had more emotional support from my partner, more on understanding that the pills affect me during the week and I don't realize it. [...] Also, I'm very forgetful, so I appreciate any reminder I can get."

Several users also stated that checking in also signaled the partner's attention to contraception as well, which both people in the relationship should be concerned about. However, there were some notable exceptions to this general feeling of discontent concerning partner engagement. In particular, one pill user did not want her partner involved, since she saw it as unproductive and annoying:

R3-user: "He doesn't remind me very much anymore. He's only done it like a couple of times, and it's been a little irritating because I'm like, 'You don't know about this! Let me deal with it.'"

R3 was the only relationship in which the pill user actively discouraged communication from their partner. In general, though, the majority of the pill users agreed that they would appreciate more engagement from their partner. However, partners were unaware of how exactly they should get involved and were unaware that the users wanted support at all.

4.2.3 Partners' fear of appearing patronizing or distrusting. About half of the pill partners believed that excessive check-ins would be counterproductive, and the user would simply see it as a form of nagging. Additionally, partners often cited trust as a reason to not talk about birth control pills insofar as they believed talking about it too much might give off the impression that the partner believed the user was unreliable in taking their pills:

R5-partner: "I trust her with it. I know she's going to take it, she's responsible so it's not something that I'm worried about. I'm not going to nag her about it. She knows what she's doing."

The pill users we interviewed were particularly dependable on taking the pills daily, with most users only missing one or two pills a year and none missing the pill twice in a row. From the

partner's point of view, this reinforced the idea that additional engagement on their end would serve no purpose given the users' reliable pill taking practice. This has led to the current situation, where birth control is rarely ever talked about, and when it is discussed, the conversation is usually started by the pill user. This comes with an implicit understanding that if nothing is talked about, then the pill user was taking the pill properly and there were no issues to raise. Partners interpreted this lack of communication as a sign that they should stay away from involvement, and they thought their involvement could come off as patronizing. As one partner stated:

R3-partner: "I think she would just get offended by a lack of trust from me as her boyfriend that I'm not trusting her to take this pill every single day, and then it would feel like I'm being over-controlling [...]. Her decision to take the pill or not really isn't my decision either [...]. It's something that we collectively decided upon, but if at any time she really felt like she had to stop taking it, I wouldn't want to over pressure her into continue taking it."

This sentiment was usually not communicated to the pill users, though. Several users expressed frustration from the lack of involvement from the pill partners. While partners did not talk about birth control because they did not want to appear distrusting, this led some users to believe that their partners simply did not care about the effort the user put in to take the pill every day:

R7-user: "I think it [birth control] is one of those things where you first start seeing a guy, they always assume you are on it. They assume it because they don't want to deal with it if I wasn't."

Additionally, in the case of a missed pill, several users were unsatisfied with the way their partners reacted. While partners mentioned that contraception should be a shared responsibility between couples, there seemed to be an undue expectation on the pill user that if a missed pill occurred, the blame would fall on the user. Several users pointed out the stark contrast of the lack of involvement from the partner when the pill was taken consistently to the increased discussion between couples following a missed pill:

R9-user: "I've had partners be afraid when I miss a pill, and it feels that they're being selfish when they get concerned that they have to deal with it. A lot of my male partners haven't really cared about it, and they just assume it's taken care of. But if I miss a pill they get angry and that seems unfair because they only start to care if they see a problem."

The status quo created a situation where partners did not talk about contraception because they thought their involvement would be a hindrance or a point of mistrust in the relationship. The partner only started to talk about birth control during events like missed pills, which, from the user's perspective, gave off the impression that the partner did not generally care about birth control unless action was needed on their end.

4.3 Overall Reactions to the App Prototype

In order to better understand the overall acceptability of our app prototype, we qualitatively categorized each participant's reception into three categories: Positive, Lukewarm, and Negative. We found that out of the 18 participants, 10 had a positive reception, 6 had a lukewarm reaction, and 2 had a negative reaction. Pill users and pill partners had the same distribution of receptions (5 positive, 3 lukewarm, and 1 negative). For example, a participant with a positive reaction to the app said:

R6-user: "I think as long as both partners have a healthy sense of communication, this app can only benefit that relationship... I feel it could make us definitely more cooperative and make us feel like we're a team and that we're in this together."

Positive reactions were generally characterized by a user finding that the app prototype would improve communication or awareness between the user and partner while also maintaining a low level of effort for both parties. Meanwhile, someone with a lukewarm reception said:

R5-partner: "I'd have to get into the habit [of using the app]... I'd probably just text her honestly. There are so many different ways, I can just talk to her in person or I could send her a DM."

Participants with lukewarm receptions found potential usefulness or benefit in the app, but did not express much interest in actually using it. A common theme for lukewarm receptions was that the prototype could be beneficial for some couples, but would find limited use in their own relationship. There were only a handful of participants with negative reactions, who explicitly said they would not use the app. For example, a participant with a negative reaction said:

R8-partner: "The only way I could really see this being useful is if you don't flood it with useless messages, and you only put important updates in it."

We further explain the reasons for these negative reactions in Section 4.5, where we describe common challenges of using our prototype.

4.4 Benefits in Addressing Discrepancies via Information Sharing Technology

In general, pill partners played a passive role in contributing to pregnancy prevention—they very infrequently checked up on the pill user, with most partners only reacting when prompted by the user. Most pill partners were satisfied with the status quo and assumed the user was as well, but the pill user often did not convey that they wanted more active involvement from their partner. Given the nature of these problems, information sharing technology could be used as a solution to address the many discrepancies that lie between pill users and partners. In our interviews, we asked participants about their thoughts on our app prototype (Figure 1), which uses the concept of information sharing in hopes that it will shift perceived responsibility to a more equal distribution. In this section, we report how information sharing technology could address each of the following: promoting partners' engagement and knowledge about birth control pill taking, a conversation starter about contraception to increase couples' accountability, and an opportunity for emotional support.

4.4.1 Natural way to promote partners' engagement and accountability. As mentioned previously in Section 4.2.1, partners generally underestimated the effort that goes into the pill-taking process. One of the main reasons for this was that the partners were usually left in the dark about the whole process. For example, partners relied on the pill user to tell them when a missed pill happened. Partners trusted the user to take the pill, but these partners also acknowledged that being in the loop could potentially allow them to have a more active role in pill monitoring:

R4-partner: "It's good to be up-to-date [...]. Especially in my eyes, I'll think, 'Oh yeah, she's taking the pill everyday so it's safe to have sex,' but she could have forgotten and you can't know. If she forgot, then there's no way of knowing and there's the assumption that everything's fine, but it might not be [...]. I think this app is a really good tool to address this."

Some pill users also shared this sentiment. The frequency that users wanted to talk about contraception varied from couple to couple, ranging from every day to once every couple weeks, but most users indicated they would appreciate additional interaction from their partner. They

thought that the app would be a great starting point to get there, as the app's notifications could serve as a catalyst for conversation:

R6-user: "I think that if we go on it [the app] daily, it could make us closer because it's a point of discussion where we can just pull up the app and talk about it. I think it would definitely be a positive integration into our lives."

Since pill users had to perform the task of taking the pill every day, some users indicated that the partner performing a similar daily task such as opening the app every day would be a good way for the partner to show support. Furthermore, participants talked about the possibility of using our app for partners to share some accountability of making sure the pills are being taken consistently. Currently, we found that lack of communication between users and partners about contraception on a daily basis often led to assumptions on the partners' end that the pill was consistently being taken. This assumption also brought the expectation that if a pill was missed, the blame would lie with the pill user. Therefore, some pill users believed that this sharing feature could potentially ease the burden of the consequences when a pill is missed. Several users stated that when they missed pills previously, their partner blamed them for it while the partner would take no responsibility of their own. However, since both partners now had access to pill taking information through the app, these pill users believed this app could prevent scenarios like that:

R7-user: "If I miss it [a pill], I have this app that I can point to and say, "Hey, it's your fault, too. You also saw this information, too, so we're in the same boat."

Moreover, pill users appreciated the assurance of a second pair of eyes making sure that they were taking the pill on time every day. Given the severity of missing a pill, users wanted their partners to contribute to reduce the risk of pregnancy as much as possible:

R5-user: "I think it'd be useful to just make sure that I'm being held accountable for taking the pills and that he also knows what's going on. If there was an information section like where he can read up on my birth control, that would be super useful. It's pretty important that he understands what risks I'm putting my body at and what my body is going through."

4.4.2 Identifying what partners can do. In Section 5.2.2, we found that the lack of communication could be attributed to the fact that both users and partners did not know possible ways to support the pill user. Moreover, the user did not effectively communicate what they wanted to the partner. Using our app prototype, we found that readily available shared information could serve as a conversation starter while lowering the barriers for partners and users to have discussions. An example of this was the participants' positive response to the "Pill refill reminder" feature (Figure 1-b). As indicated from the survey, partners believed that practical planning for pill refills was one of the areas in which they can help out the most. However, most partners stated that the pill user usually would not inform when a refill would take place. With the app automatically informing both parties of when a refill would take place, partners felt that they can get more involved:

R7-partner: "I think the pack refill reminder would be helpful for sure [...]. At the moment, my partner just has a stash of birth control pills and I have no concept of when she needs to refill until all of a sudden one day she has to go refill and then tells me. I think that in order to have a more complete view, I could theoretically ask repeatedly, but that would probably get annoying. So I think having that [the pill refill feature] as a reminder would be good."

Overall, with the help of features like reminders and shared data analysis, many participants agreed that use of the app would foster easier communication as it would keep both the pill user and partner on the same page, which would reduce their disparities in awareness and behaviors.

Shared information technology would enable partners to play a more active role in the birth control pill process by informing them about practical tasks such as pill refills. Also, users could diffuse accountability onto their partner of taking the pill every day via the shared app.

Most of our participants further mentioned that one of the most helpful aspects of our prototype would be the features that educate the partner about the proper use and risks of birth control pills. One feature that would accomplish this included the “Learn more” button in the “Risk level tracker” feature (Figure 1-a-B). Most of the partners reported that they would use this button to educate themselves when a missed pill happened, and they could use this information to decide what to do next by initiating a conversation or the use of an additional contraception method:

R9-partner: “Having this button, step 1 would be to educate myself in a thorough and well-based way, so that you can figure out what ‘Heads up’ means. Then step 2 is to have a good conversation with your partner where it’s mutually respectful, supportive but rooted in the well-informed sense of ‘What’s safe for us? What risks are we taking? Are we comfortable with that?’”

Partners enjoyed access to this information because it allowed them to take on a more helpful and useful role in their relationship. With proper knowledge on what to do when a missed pill happens, partners felt they would be able to help the pill users in a more meaningful capacity. Shared information technology enables the partner to have access to up-to-date information about the users’ pill intake and knowledge about the pill-taking process, and gives them a much more complete picture on the full effort behind taking birth control pills.

4.4.3 Providing an avenue for emotional support. In Section 4.2.3, we reported that one of the main reasons partners did not get involved with contraception support was due to the concern that users might perceive their involvement as distrusting or patronizing. This idea was exacerbated by the fact that access to pill information is limited. Especially because the users we interviewed were very consistent at taking their pills, partners stated discussing the pill might come off as unnecessary and confrontational. However, participants perceived that our app could present a way to talk about birth control in a more discrete and casual way, something that several partners found helpful:

R3-partner: “[With the automatic notifications,] neither party is actively making the decision to send that text or ask this question. It’s like the app is doing that for you both of you, so you don’t have to worry about it [bringing up the topic] being a point of conflict anymore.”

Some partners also appreciated that there was a medium to convey their emotional support to the pill users. Because access to pill tracking information was readily available through the app, partners felt they could bring it up more often and show appreciation to the users for taking the pill consistently. Additionally, the app provided a way to become involved emotionally without needing to ask the user about it first:

R1-partner: “If I got a notification that said, ‘Congratulations, you took the pills 50 days in a row,’ I’d tell her ‘Awesome, that’s great!’ I also like that it tells me how many days in a row we’ve taken the pills because it’s a positive reinforcement.”

Furthermore, pill users and partners had differences in their levels of knowledge and comfort discussing birth control. Many of the pill users started using birth control pills before the start of their current relationships, so the pill user never communicated to the partner how much support would be helpful to them. This has led many partners to feel that they should not interfere with the process at all, as this decision was one that the pill user made even before they started dating. As a result, many partners did not know about the process as a whole or felt uncomfortable discussing it.

Some users believed that the app could provide a more non-confrontational way to begin discussion about birth control pills:

R3-user: "He's not super comfortable discussing birth control, but I don't think it's because he's unwilling to learn, it's just because he doesn't know where to start. I think this app would be really good because it provides the option for him to go as in depth as he wants to learn about it."

All of the above features created an environment where the partner was more likely to reach out to the user to check in or discuss birth control. In reaction to this, users expressed that this would help create the sentiment that they are working together to ensure effective birth control, rather than a one-sided effort:

R8-user: "I think I would just be happy and excited knowing that first he opened the app and checked it to make sure I was like taking the pills, and second the fact that he hit the notification shows that he at least somewhat cares about birth control and stuff and wants to acknowledge that."

Overall, our participants perceived that the app could lower the barrier to entry of starting a discussion about birth control, and make talking about it much less confrontational or accusatory. This benefited both the partner and user—the partner now had a medium to talk about contraception with the user and felt more involved in the process, while the user felt reassured and emotionally supported when their partner showed concern and effort in the pill process.

4.5 Challenges of Using Birth Control Collaboration Technology

While many participants gave positive feedback towards the app prototype, there were concerns as well, specifically regarding the reminder notification feature, privacy issues, burden that would fall on the pill user, and the partners' fear of appearing patronizing.

4.5.1 Excessive reminders. Although most participants acknowledged that the reminder notification feature would foster communication and accountability, some pill users stated that they would not want excessive reminders from their partners as it may become nagging:

R3-user: "I could definitely see myself getting irritated if he's texting me too much because at this point I've also gotten the app notification."

The pill users' reaction towards this feature varied based on their preference and desired involvement of their partner. There were some users who wanted their partners to remind them more often, whereas some wanted to handle their pill tracking on their own.

4.5.2 Privacy issues. Some pill users and partners felt uncomfortable with the idea that the partner could look at the pill information at any time, and the scope of information that one would choose to share in the app may vary from person to person:

R7-user: "I could definitely see this [risk prediction feature] triggering more issues if the app says I'm not protected. I might not share that with them, since it could definitely add more stress instead of getting rid of it."

Moreover, some partners also felt uncomfortable with the idea of having access to such information any time:

R9-partner: "I think my other discomfort with the app is that it makes me feel a little bit like I am the surveillance state overlooking my partner's sexual life, you know? It gives me a bit of controlling boyfriend vibes."

Although the majority said they would be comfortable sharing pill tracking information, several users mentioned that trust and comfort could change over the course of a relationship, emphasizing

the importance of being able to turn off or limit access to pill information at any time for these privacy concerns.

4.5.3 Burden on Pill Users. Even though many partners liked the idea of being on the same page as the pill users via the app, some also recognized that it would require additional work from the pill users, which they saw as burden. For example, in order to communicate with their partner that they took their pill within the app, it requires the pill user to manually go into the app and mark it as taken:

R5-partner: "But also, what if she just forgot to mark it in the app, but she actually did take it and then I bring it up, and then she goes "I already took it" or whatever. It could just cause a conflict and miscommunication like that."

Some partners and pill users even expressed that partners should have some type of role within the app, too, to increase their involvement in pill tracking:

R7-user: "I would want them to have a little Snapchat streak sort of thing. I also want the partner to get more involved with the app too, so they can empathize a little bit with having to consistently do a task."

Since the app prototype was designed to depend more on the role of the pill user, the participants suggested to compensate for the difference by adding a role for the partner as well.

Several partners also emphasized the importance of the phrasing of notifications, and that if presented in a certain manner, could come across as condescending and patronizing. The fear of appearing patronizing seemed to be more prevalent among partners than users:

R7-partner: "I think the pill user would be kind of annoyed about getting a notification since they already know they missed the pill. I don't know if I see its direct use, because I would anticipate the person that's taking the pill would have the information themselves that they missed a pill. I think as the partner in the relationship, it could definitely be useful, but as the pill user, I already know that information."

Pill users mentioned the importance of context when receiving support from their partners, and that sincere concern would not come off as patronizing:

R6-partner: "I think there's always a risk of the user being afraid of "What if my partner shames me for not doing it?""

However, users stated that if partners were cognizant of the tone they used when discussing contraception, it would reduce any implicit blame that could potentially come with discussion of pills.

5 DISCUSSION

The significance of this research lies within its specific intention to support women's health and fertility tracking efforts, both technologically and socially—a problem space that the HCI and research community at large have neglected [1]. By investigating how a collaborative technology can increase perceived support for, and engagement with, contraception methods such as the pill from a romantic partner, we surface and address gaps in romantic partners' perceptions of responsibility regarding birth control-related tasks. By doing so, we expose where a collaborative technology can facilitate effective communication and avenues for action that create a more equitable process.

We first discuss the unique challenges of shared contraceptive responsibility that hinder support. In particular, we identify partners' fear of appearing patronizing when getting involved, and

attribute this to existing social norms. Furthermore, we discuss how the seeming one-sidedness of the pill can leave the partner not knowing how to actually provide support. Finally, we discuss how these challenges should inform specific aspects for future technology designs.

5.1 Challenges of Shared Contraceptive Responsibility that Hinder Support

Consistent with the past research findings, our user and partner participants believe that technology can be an effective medium to facilitate support from individuals who desire to help but may not know how to best assist the recipient of support [28, 32, 45, 55]. Despite this opportunity for support, however, we found several challenges—partners' fear of involving in an oral contraceptive and the invisible efforts/burden required of birth control pill users—that are unique to contraception collaboration. We contribute to the existing body of literature on technology-mediated social support [28, 32, 45, 55] by uncovering the underlying factors that make it difficult for partners to provide support for contraception.

First, we found that partners were often worried about involving in birth control pill contraception because of their fear of appearing patronizing. The cause of this fear can be attributed to social norms: historically, social norms have dictated women are solely in charge of their intimate care (e.g. female body is often considered a private issue) and that it is the woman's responsibility to be on birth control [1, 14]. This can cause complications as partners feel that they would be overstepping some boundary by getting involved. Moreover, while most men believe that contraception should be a shared responsibility, they also believe that women should have agency over their own bodies and sexual health [31]. In our study, several of our pill users and partners also talked about a "silent assumption" that the user was taking birth control pills, and that this was the end of the conversation (one partner sums up this idea by saying, "It's just her thing"). Coleman and Ingham [13] similarly uncovered that young men avoid initiating conversations about birth control out of fear of an irritated or unpleasant reaction from their partner. As a result, most partners decided that abstaining from support was the safest option. However, in reality, pill users did not appear to be annoyed at the possibility of support. Rather, we found that they reported insufficient involvement from their partners in contraception support, similar to [10, 11, 57]. Pill users went on to mention that our app prototype could potentially address this issue. For example, users stated that they would feel more safe about potential contraception risk if they knew that their partner was also monitoring pill intake status through the app.

Despite wanting involvement from their partner, however, we generally found that pill users were hesitant to ask for support from their partners. This has analogues to the conclusions of Skeels et al., who found that breast cancer patients tend to under-utilize support networks from friends and family despite wanting help, and that friends and family similarly do not know what would be helpful or how to approach the cancer patient, despite wanting to support them [55]. Additionally, for some members of the LGBTQ community, social stigma might deter asking for support, since topics such as fertility are considered taboo [3, 52]. The one non-binary couple in our study confirmed these findings, stating that they kept discussion of birth control pills to a minimum since talking about it reminded the pill user of the disconnect between their gender identity and their body.

A further complication for contraceptive support is the lack of visibility of the burden and efforts as only one-sidedness takes the pill. While existing literature generally frames partners as unwilling to provide contraceptive support to the user [10, 23], we found that partners were willing to give support; but in the partner's mind, there was not very much that they could do to actually help with taking the pill. On a surface level, the user takes the pill once a day, and that is all that needs to be done. However, there are a plethora of invisible challenges that typically are only handled by

the pill user. These range from logistical burdens (i.e. waking up early to take the pill, making sure to pack a pill before leaving for the day) to emotional (such as the stress that arises from missing a pill). These burdens are typically not made visible to the partner, giving the illusion that there is nothing the partner can do to help. Technology can assist in shedding light on sensitive issues [4, 32], so applications such as our prototype could inform the partner about these burdens and provide more opportunity for the partner to provide emotional support and acknowledgement.

Based on the overall reception to our app prototype, we believe that collaborative technology can address many of the issues unique to shared birth control responsibility. Our prototype design was able to highlight much of users' invisible work of taking the pill, such as monthly pill refills and handling missed pills, and presented the partner with opportunities for support. It also served as a way to talk about birth control without appearing confrontational, given the automatic nature of the app messages. We also received important feedback regarding privacy and information control—both users and partners agreed that users should be the ones completely in charge of what data would be visible to the partners and should have the ability to rescind partners' viewings at any time. However, based on the feedback from our participants, there are several ways that we would modify the design of our app. In the next subsection, we highlight key takeaways for future designs.

5.2 Design Implications for Contraception Communication Technology

When reviewing the feedback given to our app prototype, we found two main areas of improvement to our design, which have implication for broader communication technology design. First, we found that participants had positive reactions to the way the app could affect the *agency* of both partners, particularly in how the app enables increased support from the pill partner. Second, we identified specific kinds of support that couples found helpful—most notably emotional and informational support. Therefore, we discuss how collaborative technology can be designed to increase partner involvement to the level desired by users and present concrete ways for partners to contribute to the process.

5.2.1 Maintaining Agency for Both Parties. In the case of contraception via the pill, the pill user possesses complete agency over the physical action of taking the pill, resulting in little to no agency on the part of their partner. This could explain how in one study, women who used non-hormonal forms of contraception (i.e. rhythm, condoms) were more than 3 times as likely to state that contraception is shared with their partner [11]. Our pill users wanted to maintain this control while also expressing the desire for more support from their partners in emotional and communicative ways. This finding suggests that, although there is no way to equally share in the action of physically taking the pill—which pill users did not want anyway—the best way to support a partner in an action that one has no control over is by being open to engage with the process through demonstrating awareness, communication, and acknowledgment. Despite pill partners' fears that support could come off as sycophantic, our pill users agreed with Coleman and Ingham's notion that talking about contraception would be "perceived positively by [users] as an act showing care and respect [13]". Meanwhile, technology can fill a role of giving more agency to the partner by giving them simple tasks to do (e.g. "check on your partner", "ask about the next pill refill") that both signals support to the user and gives partners a sense of responsibility in the process.

When designing technologies intended to equalize responsibility of seemingly one-sided tasks, considering the "invisible work" that the action-taker faces is essential for uncovering how they can and want to be supported. For example, pill users in this study expressed wanting their partner to acknowledge the effort put into taking the pill on time every day. A technology-mediated support

tool might present opportunities for this type of interaction for both partners, and in particular providing agency for the pill partner to provide the right type of support. Our pill user participants expressed that collaborative technology best assists in *re-patterning* with their partners, which Branham et al. define as "using technology to introduce new, semi-structured activities into the couples' lives" [8]. These results have implications beyond the contraception domain. Past research has also found the issue of "invisible work" in several other collaborative settings related to health [12, 35, 55]. For example, in the caregiving space, caregivers are often faced with their own stress and concerns, but this information is generally unknown to people who could potentially support them. Caregivers are reluctant to reveal their own challenges and often believe that others are unable to assist in support, despite evidence others are willing and able to assist when asked to. Chen et al. [12] suggest that technology can support caregivers by more frequently assisting in "articulation work", or the act of explicitly stating the problems that they are facing, which we have also concluded to be effective for the contraception field.

Another important facet of building technologies to engage others in highly personal tasks such as contraception is to consider the privacy preferences of individuals when it comes to sharing information. Several pill users wanted the option to be able to turn off access to this information at any time, citing a potential change in relationship status as the reason. Given that over 70% of breakups are sudden and unexpected [7], collaborative technology that shares birth control pill usage information should prioritize flexibility in sharing the types and amount of information with partners. While many of our pill user participants expressed that they would like their partners to be aware and would share information, others were less willing. Technologies that intend to bridge the gaps that arise due to complex social influences should allow the support recipient (in our case, the pill user) full control over their information and who it is shared with, as not every person will have the same wants, needs, and comfortability with others engaging in the process.

5.2.2 Using the Right Type of Support to Promote Visibility. Cutrona and Suhr [18] investigated the ways marital couples gave and received support when one partner was experiencing stress. The authors established five different categories of spousal support, including informational, emotional, esteem, tangible (practical), and social network. These closely aligned with the types of support that our study found, which were emotional, practical and informational.

Cutrona and Suhr found that there were high levels of satisfaction with emotional support from partners across a range of contexts, indicating that caring and empathetic behaviors are well received [18]. Similarly, the pill user participants in our study stated that emotional support such as occasional acknowledgment and shows of appreciation would assure them that their partner cares about and is cognizant of their shared commitment to pregnancy prevention. However, our partners thought the only support they could give is practical. One partner claimed "*I don't think there is any emotional aspect to taking the pill, so I don't know how I could help in that area.*" Offering mechanisms to provide emotional support can be critical to address the communication gap between users and partners because our findings indicated that partners often under-valued its importance. This is further evidence that if people are able to understand, acknowledge, and act on unseen emotional needs of others, they are more likely to be able to offer support to them in ways that are satisfactory and welcomed [8]. In the context of birth control pills specifically, the partners can provide support by recognizing the invisible efforts and challenges faced by pill users. Technology can bridge this gap by creating avenues for partners to provide different kinds of support by making support opportunities more explicit, such as the notifications in our prototype reminding the partner to check in and acknowledge the work the user is doing. This would not only encourage pill users to more clearly communicate with their partners what kind of help they desire, but also allow the partners to proactively contribute through explicit tasks and features of different types of support

that respond to the pill users' invisible challenges, which would give them more agency over birth control pill usage.

Furthermore, several participants were enthusiastic about informational support features such as educational materials, pregnancy risk estimates, and the "Learn More" link to educate users and partners. Both users and partners felt that educational materials about birth control pills were generally inaccessible, consistent with previous studies about access to fertility education [14, 37]. Therefore, providing informational support in shared birth control tracking apps would provide more opportunities for partners to familiarize themselves with pill and risk tracking, and thus could contribute to proper birth control pill usage and share the burden of pregnancy prevention. Meanwhile, other pill user participants indicated that practical support, such as giving notifications of pill refills and of events like missed pills to both users and partners, would make them feel safer about pregnancy risk since their partners are also monitoring the activities. However, enthusiasm for informational and practical support was subject to high levels of individual variability, with some participants finding it potentially patronizing or unnecessary. In general, future technology must be aware that users might not find certain types of support very helpful, and that these distinctions often vary from person to person.

Overall, shared birth control pill tracking technology should allow partners to easily recognize the invisible challenges that the pill users encounter and the ways they can help by designing tasks and features related to emotional, practical and informational support for them. Moreover, if partners are kept in the loop with the technology, pill users would be able to communicate more easily with their partners what kind of help they are seeking. Bridging the gap between pill users' desired support and partners' lack of a concrete role via such technology will help distribute contraception engagement and accountability more evenly.

6 LIMITATIONS AND FUTURE WORK

There were several sources of limitations for this research. First, almost all of our subjects were young college students, with the oldest participant being 27 years old. All of our participants were from the United States, and we hypothesize that culture and background affects how one perceives contraception and openness to discuss it. All except one of the couples we interviewed were heterosexual and cisgender, and we believe that gender and sexual orientation has a big influence on perceptions of pregnancy prevention. Additionally, there was a bias in our sample towards higher education, with the majority of participants currently enrolled in college. For these reasons, our sample of subjects might not be completely representative of the entire population of birth control pill users and their partners. Based on previous work concerning the LGBTQ community and fertility issues [3, 52], many LGBTQ members feel a heavy stigma when talking about topics like pregnancy, and online access to reproductive educational materials is often heavily biased towards heterosexual and cisgendered couples. From our own interviews, R9-user, a non-binary participant, often felt uncomfortable talking about birth control with their partner because their perception of their own gender did not reconcile easily with the biological reality of their body, and talking about birth control was a painful reminder of this fact. We encourage future work investigating the interaction of this technology with more LGBTQ participants. Future studies should also focus on perspectives from older couples and couples that are cohabiting, engaged, or married. Married couples, for example, might have different perspectives on their long-term fertility goals. This study also focused specifically on birth control pills, but couples might have different thoughts on shared responsibility if using other contraception methods. Additionally, demonstrations of our app prototype were limited to verbal explanations and visual aids, which does not paint the full picture of the collaborative technology. Future works should develop a high-fidelity app prototype that couples could use, and potentially study its use over the course

of several months to gauge its impact over time. If the use of a future app prototype was studied over a longer period of time, participants' perceptions of the app might have been different. While the participants interviewed in this study mostly had positive views of the app, they might have more negative perceptions such as privacy issues if they had to actually expend the extra effort to maintain more active contraception communication with their partner over several months. Additionally, we hypothesize that the medium in which these interviews were conducted had some influence on the participants' reactions. If we had interviewed the couples together instead of separately, we think that pill users would have been less negative about the lack of support from partners, and partners might have reframed the ways and frequency of their support-giving. Finally, alternative methodologies such as a co-design study could be useful to generate more tailored and customized design concepts for shared contraception technology that account for the unique relationship dynamics, tensions, and varying levels of responsibility among couples.

7 CONCLUSION

This study investigates how and why romantic partners differently perceive and expect each other's engagement in using birth control pills, and how a shared birth control pill tracking system can bridge these discrepancies by fostering accountability, awareness, collaboration, and communication. We found that pill users wanted more involvement from their partners, but had trouble communicating relevant information to them. On the other hand, the partners wanted to provide more support, but were unsure of how to do so as they assumed that the pill users didn't need their help and lacked a concrete role in birth control pill usage. Through our app prototype, we uncovered that using such information sharing technology would (1) highlight pill users' efforts to partners and facilitate emotional connections, and (2) reinforce partners' involvement in birth control pill usage, thereby increasing accountability. Based on our findings, we recommend that shared birth control pill tracking tools allow information sharing to keep pill users and partners on the same page, create easy access to relevant information and educational materials to help partners identify potential practical and emotional support methods, and provide important informational updates and notifications that would improve communication and collaboration. The tools also need to consider the variability of individual preferences and of trust and privacy in couples, and we suggest that they carefully choose wording and tone of their content, and allow their users to customize the scope of shared information as well as notification content and frequency. Our research examines underlying reasons for discrepancies in birth control responsibility and motivates the design and development of shared information technology to encourage more balanced engagement in romantic relationships.

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