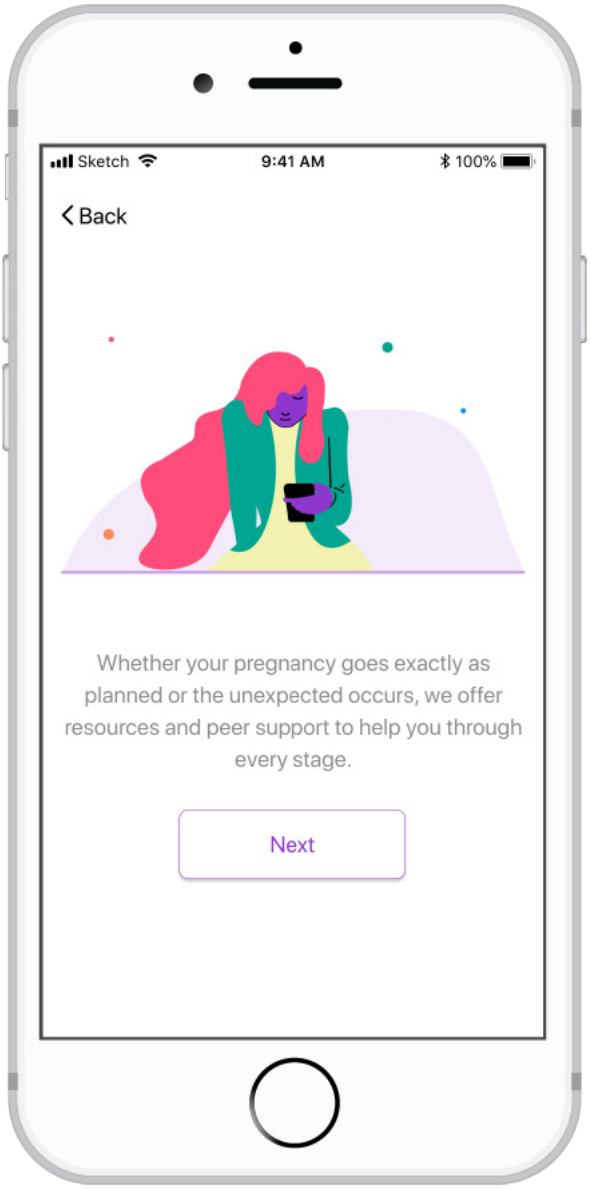
Expectant

SI 699 Mastery Project

Final Report

Candyce Jessamy
Denver Nash
Kelly O'Sullivan
Kylie Wojciechowski



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Executive Summary

The U.S. culture is predominantly silent when it comes to pregnancy loss.

While many mistakenly believe it to be a relatively uncommon occurrence, pregnancy loss can affect up to 20% of women. This silence shows up in pregnancy tracking apps, leaving women with hollow apologies or algorithms that continue to assume women are pregnant making matters worse.

Conducting research on pregnancy loss, comparing pregnancy tracking applications, and speaking with women who have experienced loss, we were able to discover key findings that informed our ideation process to develop a design solution aimed at assisting women who experience pregnancy loss.

Those key findings identified a solution needs to include the following:

- Create a space for healing after pregnancy loss
- Help women communicate with others who've also experienced loss
- Provide ways for users to memorialize their loss
- Avoid magical thinking

Our final solution was to build a journaling application that compiles entries into a narrative timeline to help women tell their pregnancy story, regardless of the outcome. In cases of loss, women are offered:

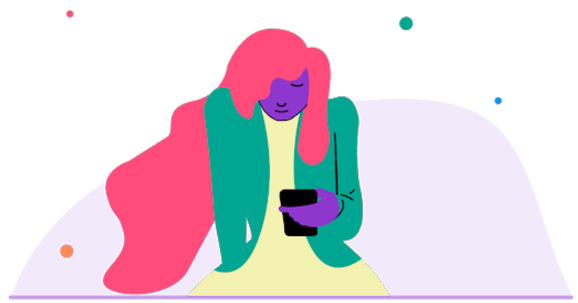
- Writing prompts to help them process their feelings
- Forums to find others who've also experienced loss
- Other resources to memorialize their loss and find healing

Project Motivations

Our project addresses the often unconsidered experience of pregnancy loss, especially for users of pregnancy apps.

Up to 20% of known pregnancies result in loss, but, as illustrated in a variety of secondary resources, most apps aren't designed to handle this use case in a dignified, careful way—or even at all.

Research by Katherine Chen, MD and professor and vice-chair of education in the Department of Obstetrics, Gynecology and Reproductive Science at the Icahn School of Medicine at Mount Sinai, indicates that about four in five U.S. women of childbearing age have a smartphone, with about 25% using some form of health app, including pregnancy-tracking apps [4].



So, it follows that at least some not-insignificant number of women using pregnancy-tracking apps have experienced a pregnancy loss, and it's clear that most of these apps (and complementary targeted advertising that builds a profile of apps' users as to-be mothers) are not equipped to handle this type of situation, at least as a standard use case.

In a 2018 Mashable article, Olga Massov wrote that, after experiencing a miscarriage, that ["i]t wasn't until I logged onto the app's website on my computer that I discovered there was no option to label a pregnancy ending in a miscarriage. I could either delete the pregnancy entirely or let the app believe I was still pregnant"[5]. Another article, in The Atlantic, recounts the experiences multiple women have had after experiencing pregnancy loss: "she [Cindy Jenkins] found the process of getting rid of her Glow account to be cumbersome, which only amplified her pain. 'It should have been easier to figure out how to 'report a loss,' which is what they call it,' Jenkins told me" [6].

Goals

Primary Goal & Success Indicators

With this project, our primary goal was to pick up where most pregnancy-tracking apps fail by handling cases of unexpected pregnancy loss in dignified ways—by not treatng them as edge or stress cases, but as normal, expected use cases.

From this primary goal, we define success according to whether users find it intuitive to report pregnancy loss in our tool and whether users feel their pregnancy loss experiences are acknowledged and validated.

Secondary Goals & Success Indicators

One of our secondary goals consisted of designing a tool that thoughtfully facilitates or provides a peer-to-peer community space, educational resources, and opportunities for users to explore and reflect upon their feelings and then share those with others.

Our other secondary goal was to design the tool in such a way so that people could use it at any stage of their pregnancy or pregnancy loss experience. By not limiting its user base to just those who have experienced pregnancy loss, we're able to ensure a low barrier to entry and adoption as any pregnant person could find value in it. We're also able to avoid isolating or othering people who have experienced pregnancy loss by not requiring them to begin using an altogether new tool to find support.

From these secondary goals, we define success according to whether users find value in the features that allow them to connect, learn, reflect, and share about their pregnancy and/or pregnancy loss experiences. We further define success according to whether users adopt and find value in this tool before they (or even if they don't) experience pregnancy loss.

Background

Using Google Scholar and the U-M Library's database search tools, we searched through the PubMed, PubMed Central, SAGE, and Taylor & Francis databases with the search terms "miscarriage", "stillbirth", "perinatal loss", "pregnancy loss", "pregnancy loss + grief", and "pregnancy loss + support" in order to familiarize ourselves with the academic landscape surrounding our topic. We found 15 articles related to pregnancy, pregnancy loss (miscarriage and stillbirth), and support after pregnancy loss.

From our research, we learned about the unique grief process associated with pregnancy loss, the symbolic and often multifaceted nature of this type of loss, and best practices for supporting people experiencing this type of loss, including memorializing the loss, emotional validation from professionals, information from and contact with professionals, emotional validation from peers, and meaning-making.

According to the Center for Disease Control's "National Vital Statistics Report", almost 4 million (3,945,875) live births were registered in the U.S. in 2016 [1]. Generally, about 10-20% of known pregnancies don't result in live births, instead ending unexpectedly early, in either miscarriage (from conception up through the 20th week of gestation) or stillbirth (after the 20th week of gestation through delivery), according to the American College of Obstetricians and Gynecologists [2] and public health researchers at the University of North Carolina School of Public Health and the University of California, Davis [3]. Researchers at the University of Western Ontario, Canada, indicate that most of these losses are miscarriages, occurring within the first three months following conception [4]. Further, these estimates refer only to "miscarriages in medically recognized pregnancies and diagnoses confirmed by medical practitioners" [4]. That is, other early pregnancy losses may be underreported because they do not require medical intervention.

Despite being the most common complication of pregnancy, 55%—a majority—of Americans believe miscarriage is an "uncommon" event [5]. This "absence of the awareness of pregnancy loss … can … compound the sense of isolation and stigma experienced by … women" [4], in addition to the "'invisibility' of these losses [and] the lack of public recognition and ritual they are accorded" [6]. According to [7], "In U.S. culture, pregnancy is generally expected to lead to a new mother with a new baby"—and when it doesn't, "no mechanism or ritual has been established in our society to mourn the loss" [8].

Grief

According to [9], "descriptions of grief following miscarriage are highly variable but, on the whole, seem to match descriptions of grief used … to characterize other types of significant losses", including yearning, sadness, crying, fatigue, appetite and sleep changes, preoccupation with the loss, and guilt. From [10], "patients were satisfied that they were treated as if they were suffering from normal grief."

Especially in losses that occur early in a pregnancy, the grief can be considered "disenfranchised", too, in that, without "tangible proof" of the pregnancy, like ultrasounds, "there is no token of remembrance to mark the child's existence" [4], further contributing to the isolation of the would-be parents. According to Capitulo, the lack of visible rituals can "make the tragedy a non-event and the loss a non-death", which can lead to "exacerbated anger, psychiatric disorders, and perpetual sadness" [11].

According to Callister, "perinatal loss [that from the 20th week of gestation through birth] stimulates a unique form of grieving, because the child is part of who the parents are, a part of their identity" [12]. It's a "unique mourning situation" in that, while "the parents' expectations and joy at the prospect of a new life change into despair and grief … there is only minimal recognition. Societal expectations for mourning a perinatal loss are noticeably absent such as funerals and associated traditions" [12].

Loss

This section will detail research about what the loss of a viable pregnancy can mean in a symbolic sense. According to Brier, the grief after

miscarriage or other pregnancy losses can involve “distress over the loss of a symbolic, as opposed to an actual, relationship” [9].

Self-Esteem / Status / Identity: According to Radford and Hughes, “[p]regnancy loss (miscarriage and stillbirth) has several component losses; not only is there a real and fantasized loss of a baby, but there may also be a significant loss of self-esteem” [13]. Further, “for some women, miscarriage resulted not only in the loss of a baby but also the loss of the meaning of being a woman and a parent” [13].

Anticipated Future: According to Brier, “[A]fter a miscarriage, the individual seems to dwell on images of an anticipated future and the hopes and dreams about what was to be rather than on past experiences” [9]. That is, a would-be parent may be yearning for their “mental construction of a relationship and future” rather than any direct experience.

According to the journal Paediatrics & Child Health, “[t]he death of a baby is especially difficult to endure because parents envision an entire lifetime for their baby from the moment of the confirmation of the pregnancy, and because their expectations and vision have been built over time” [14]. Fernandez, Harris, and Leschied also discuss this, in that in addition to the loss of the pregnancy, there’s also the “loss of the hope of a healthy child, loss of the remainder of the pregnancy duration and would-be due-date, loss of identity as a parent, and so on” [4].

Support

From Séjourn, Callahan and Chabrol, considering the psychological distress, impact on well-being, and feelings of isolation and solitude stemming from miscarriage, the “quality and availability” of support available should be considered [15]. From Côté-Arsenault and Freije’s survey of 305 French and Belgian women who experienced miscarriage, 289 (95%) felt that some sort of post-miscarriage support was necessary in general and 277 (91%) would have personally wanted support following their own miscarriage [7].

Some of the most common and effective support techniques are listed below:

Memorializing the Loss: According to Callister, “[p]arents experiencing perinatal loss found that expressing emotion, being present, having memorabilia including photographs, and making meaning of the experience were the most helpful support strategies” [12].

Advice for health-care professionals is provided in [14] for cases of unexpected pregnancy loss, especially perinatal losses: help would-be parents form attachment and bonding memories, optimize immediate interactions with would-be parents, ensure that spiritual support is available, and explain the need and procedure for an autopsy and the options and procedures for memorial services.

Emotional Validation from Peers: Similarly, Boyle, Mutch, Barber, Carroll, and Dean conducted an online survey with 24 volunteers working with a 24-hour telephone support service for the Australian Stillbirth & Newborn Death (SANDS) organization. They found that “peer support delivered by parent-based organisations addresses a significant need following pregnancy loss … [and] may best be viewed as part of a continuum of care, offering stand-alone support and the ability to augment or facilitate access to formal care as needed [6].

From Radford and Hughes, “[t]here was a general consensus that those who had not experienced a miscarriage could not satisfy the support needs of the women.” Citing Maker and Ogden (2003), [13] found the majority wanted to talk to others. Further, from, Gerber-Epstein et al. (2009), they found that the best source of support was women who had also experienced a miscarriage [13].

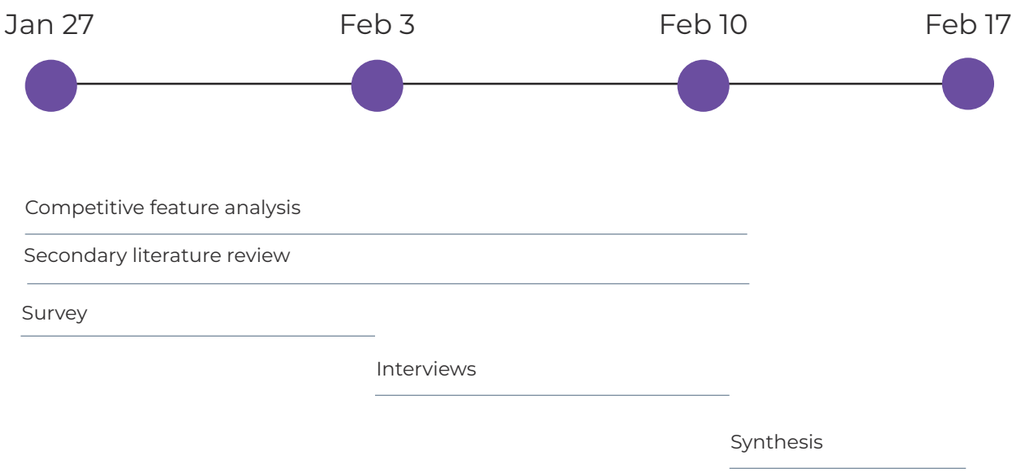
Meaning-Making: Brier suggests that people who’ve experienced unexpected pregnancy loss be encouraged to “articulate the specific nature of their loss [to] … facilitate grieving … and concretize the experience” [9]. By helping people articulate their “personal legacy of the loss” and put their thoughts and feelings into words, they may experience “an increased sense of control … and be better able to share [their] feelings and thoughts with others, thereby facilitating support” [9]. Capitulo’s work is aligned with this: “interventions should focus on making meaning of the loss for the bereaved … facilitating expressions of grief, and providing a supportive environment for the family” [11].

Research Plan

Some of the key questions that we sought to address during the research phase of our project included the following:

- In what specific ways are other pregnancy-tracking solutions falling short?
- What information do expectant people and their families want to see during their pregnancies?
- What information or resources would these expectant people want to see if their pregnancies have ended unexpectedly? (And will they even want to see anything if their pregnancies have ended?)

In order to tackle our problem, we devised a comprehensive research plan comprised of secondary literature review, competitive feature analysis of the most popular pregnancy-tracking apps, a survey used as both a data-gathering tool and means to recruit and screen participants for interviews, and finally the interviews themselves.



Research Methods

1 Competitive Feature Analysis

The most popular pregnancy-tracking apps were selected from the Google Play store and the Apple App Store for feature analysis. Popularity was estimated by download rate, search result display order, and number of reviews left within their respective stores. Apps that did not have at least 1 million downloads on the Google Play store were not selected. Furthermore, due to the sharp drop off in user downloads beyond the top displayed search results [16], anything below the top 3-5 displayed items is likely already uncommon.

As a result the following apps were chosen for review:

	App	Reviews	Downloads	Devices
	BabyCenter	802.1k	10M+	iPhone, Android
	Pregnancy +	324.7k	10M+	iPhone, Android
	What to Expect	175K	1M+	iPhone, Android
	Ovia Pregnancy	138.5k	1M+	iPhone, Android
	Pregnancy Week by Week	113k	1M+	Android
	I'm Expecting	71K	1M+	iPhone, Android
	The Bump	36.7k	1M+	iPhone, Android
	Sprout Pregnancy	34.2k	1M+	iPhone, Android
	I'm Pregnant	31k	1M+	Android

Apps under review were assessed on their implementation of typical features such as visualizations, community integration, educational articles, and symptom tracking to identify general trends among tracking apps. Each app was specifically reviewed on its handling of pregnancy loss and subsequent procedures for addressing user needs.

2 Survey

Our survey was created as a means to both gather data and recruit and screen participants for subsequent interviews. The primary goals of the survey were to learn what participants found useful about pregnancy-tracking apps, what types of information participants most relied on pregnancy-tracking apps for, and how participants who experienced unexpected pregnancy found support and resources.

We used Qualtrics to create our survey and then distributed the survey via social media platforms (Facebook and Twitter), a school-wide listserv (umsi.all.open), and /r/miscarriage on reddit. Our goal was to collect 30-40 responses, but we exceeded our goal, gathering 99 completed surveys from respondents in five different countries. We decided to analyze the data of the 89 respondents in the United States only to avoid potential skewing due to cultural biases of the few respondents from outside of the states. Since our survey was comprised of questions with categorical answers, we analyzed our respondents' answers using frequency tables, bar charts, and cross tabulation.

3 Interviews

Between February 4, 2019 and February 15, 2019, we interviewed eight people who fit into two groups that we were interested in: those who had used pregnancy-tracking apps and had experienced at least one unexpected pregnancy loss (seven interviews) and those who had used pregnancy-tracking apps while pregnant (one interview). We conducted these interviews using various remote interview methods (by phone, Bluejeans, or Google Hangouts).

Once complete, our interviews were transcribed via Otter.ai, and we each then distilled notes from these transcripts. We felt the best way to make connections between the experiences, ideas, thoughts, feelings, and opinions brought up by interview participants would be to craft a digital affinity wall. Once we had completed interviews and added notes to the affinity wall, we drew thematic connections between all of our notes to support various significant findings we subsequently used to inform our design requirements.

Research Findings

1 Competitive Feature Analysis

The app feature analysis revealed the consistent lack of support from apps in addressing pregnancy loss. In the worst of cases, apps don't allow users to report a miscarriage and thus force users to abandon or delete the apps completely. Most frequently, however, the app allows users to report a miscarriage, acknowledging the loss by offering some form of message sympathizing with the users loss (Figures 1-2), but ultimately doesn't address the issue at hand, advertising their fertility tracking app (Figure 3) or suggesting that the user come back to the app when they're "ready to try again" (Figure 1). This highlights the implicit expectation that users will simply get pregnant again and do not appropriately respect the time of bereavement inherent to a lost pregnancy.

Figure 1

Figure 2

Figure 3

In a few cases, a pregnancy app may indirectly address the loss by offering informational articles, directing users to seek additional help elsewhere, or by facilitating the use of online communities to find support (Figures 4-5). These features were only found in two of the reviewed apps, however, and, in some cases, were not easily found even after reporting a loss.

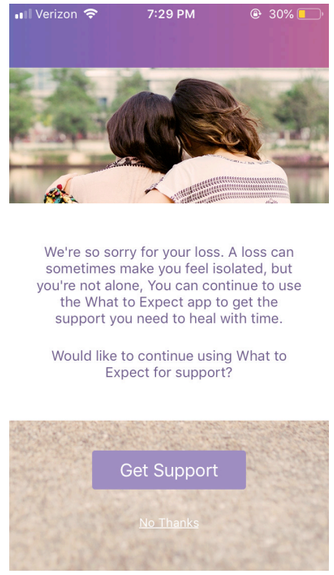


Figure 4

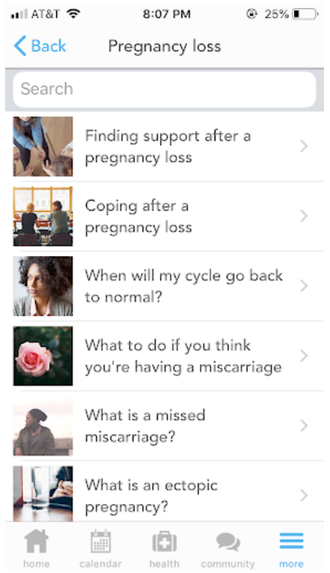


Figure 5

The feature analysis supported our ideas that pregnancy loss is treated as an edge case within pregnancy-tracking apps in the majority of instances.. The emotional needs and concerns that women experience after loss are not often addressed in apps, and instead these apps encourage users to revisit the app when they are ready or even to try for another pregnancy right away.

Research Findings

2 Survey

Most of our respondents were between the ages of 25-34 and 98.9% indicated being pregnant in their lifetime and 77.5% of those respondents reported experiencing a pregnancy loss.

Of those who indicated a pregnancy, 94.3% reported using a pregnancy-tracking app. Growth tracking/comparison visualizations, followed by symptom/health trackers and educational articles were the features most utilized.

Notably, the vast majority of respondents indicated that they only used pregnancy apps for less than 12 weeks and most respondents who experienced loss reported that their loss occurred in the first trimester (1-12 weeks). Post-loss, women relied most on online forums and again turned to educational articles.

Overall, respondents were pleased with the pregnancy-tracking app experience — even those respondents who had experienced loss. The vast majority of users (92.77%) rated pregnancy-tracking apps as at least somewhat helpful.

Our survey results were illuminating in many ways. First, it helped us to understand where women seek support after loss. We now know what resources we should prioritize in moving forward with the design of our solution. Our results also indicate that women are not continuing to use pregnancy tracking apps after they experience loss. We hypothesize that this is because most apps do not provide resources to support women after they experience a loss, so they are forced to seek resources on their own and discontinue use of the app.

Lastly, despite the fact that pregnancy-tracking apps do not treat pregnancy loss as a primary use case, they are well-received for their intended purpose. The majority of women indicating that pregnancy apps are at least somewhat helpful allows us to narrow the scope of our project. It would be unnecessary for our solution to include revamped versions of features that are already well received, like growth tracking/comparisons. We will have to examine whether we want to have a standalone solution that does not incorporate features that pregnancy-tracking apps already do well or if we want to incorporate our solution into an already existing app.

Expectant

Research Findings

3 Interviews

Findings from across our various interviews both confirmed some hypotheses of ours as well brought new user insights to the fore. Questions covered everything from feelings after conception to the interview participant's reflective feelings about how society treats early pregnancy loss, and our takeaways from the interview process are equally broad. Our findings are as follows:

A **Participants were generally excited when they became pregnant for the first time.** However for many, especially after their first pregnancy, these feelings were accompanied by anxiety over the myriad of health complications that can occur during pregnancy.

B Apps were chosen and used by our participants for a variety of reasons; however, **educational information and growth visualizations seemed to be the most commonly used features.** Pregnancy tracker usage was an area in which we found users developing unique use cases for the app or apps they chose to use. Some infrequent uses of pregnancy-tracking apps we found included using multiple apps to compare information, using multiple apps each for a different purpose and using apps as a note-taking resource.

C With the exception of one, none of the pregnancy-tracking apps that our participants used included as part of their standard experience some way of handling early pregnancy loss. Many of the apps in question display some sort of message of acknowledgement that the user has experienced pregnancy loss, but beyond that the app is rendered essentially useless to a person whose pregnancy is not ending in having a healthy child. **Users who experienced early pregnancy loss were forced to use a variety of means to sever digital ties with their apps as a way to cease notifications about their pregnancy, including fumbling around in settings menus and deleting the apps outright.**

D Our participants used a variety of support types to help them process their early pregnancy loss. **Common to what they all found helpful was being able to interact with some sort of community to either express their feelings about what they had experienced or learn how others had coped with their early pregnancy loss.** Therapy, online forums, and speaking with family and friends were among the most used forms of support.

E **There was no generally agreed-upon time or milestone during a pregnancy when participants chose to download pregnancy-tracking apps.** Our interview participants reported acquiring a pregnancy tracker the first day they had a positive pregnancy test, some time after they became aware they were pregnant, using a period tracker that included pregnancy tracking functionality, and others.

F Growth visualizations, educational articles, to-do lists, and forums are common features that our participants enjoyed in pregnancy-tracking apps. A sentiment that was shared by one interviewee was that being pregnant felt like having something she couldn't quantify going on inside of her. **Having information, visualizations, and community interactions seemed to help alleviate some feelings of uncertainty that go hand in hand with being pregnant.** Notably, none of the participants mentioned emotional or psychological support of any kind as a positive aspect of their experience using these apps.

G Bereaved expectant mothers experience a range of thoughts and emotions after a pregnancy loss. **Feelings, questions, and now-canceled plans for the future are internalized and perpetually revisited.** It is important to note that interview participants reported that much of the processing that occured after pregnancy loss was internal for a variety of reasons.

H Our participants all felt shortcomings in their support systems. **Notably, pregnancy-tracking apps provided very little to absolutely no support for early pregnancy loss.** In real-world interactions, participants also felt as though societal perceptions of early pregnancy loss resulted in a lack of emotional and psychological support from their social circles and families.

Common Findings

The following themes were common among our research methods:

1 **Most pregnancy-tracking apps do indeed fail at supporting women post pregnancy loss.** This finding was discovered in our competitive analysis and echoed during our interviews. It can also be derived from our survey responses. Most women indicated that they experienced a loss within the first twelve weeks of pregnancy while most women also indicated that they discontinued app usage by the twelfth week of pregnancy.

2 The most popular features of pregnancy-tracking apps are growth visualizations and other educational content. This finding was discovered from the surveys and echoed in our interviews.

3 **Women most frequently rely on the support of their social circles, online communities and sometimes enlist professional help, such as that of a therapist**. Our secondary research helped us to understand the importance of validation from peers and professionals. We saw this theme again when survey results indicated community forums as the most used support system women used after loss. Finally, our interviews indicated that the support of family, friends, forums and therapists helped them initially cope with their pregnancy loss.

UX Requirements

The following UX requirements from synthesis of the findings of each of our four research methods. Each requirement includes a rationale, measure of success, and prioritization (either “must have”, “should have”, or “nice to have”, in decreasing order of importance.)

1

Priority: Must have — differentiating factor

Create a separate space for healing after a pregnancy loss – avoid pushing users immediately back into a fertility- or period-tracking solution.

Rationale: Feature analysis shows that the majority of pregnancy apps respond to pregnancy loss but pushing users to come back when they’re “ready to get back on track” or to start using a fertility app to begin trying again. This is culturally insensitive to the time required to mourn the loss of a loved one that would be typical in any other social interaction.

Measure of success: Users experience this solution as a standalone means by which to receive support after experiencing pregnancy loss; it is not used to track pregnancies, periods, or fertility.

2

Priority: Should have

Provide actionable advice that helps users address the psychological, emotional, and mental effects of pregnancy loss.

Rationale: Our interviews showed that users of pregnancy trackers that experienced pregnancy loss have an abundance of questions, thoughts, and feelings in the period immediately following the loss that all currently go unsupported. Support that these interviewees felt was missing was that which helped to guide them through the difficult and painful aspects of processing a recently experienced pregnancy loss. Further, through our secondary research, specifically Radford and Hughes, we found that “women needed recognition of … their emotional feelings … at diagnosis, during and after … miscarriage” [14].

Measure of success: Users receive advice that helps them toward closure around their unexpected pregnancy loss.

3

Priority: Should have

Provide educational articles and other tools that help users stay informed about the physical effects of pregnancy loss.

Rationale: Through our interviews and surveys we discovered that informational articles were among the most popular pregnancy tracking app use cases among our participants. Considering the current lack of information regarding pregnancy loss in these apps our solution should aim to be in line with the type of information that users of pregnancy trackers already prefer to consume while providing educational content that they do not have access to.

Measure of success: Users are informed about what their bodies are going through after an unexpected pregnancy loss.

4

Priority: Should have

Provide ways to communicate with others who’ve experienced pregnancy loss, whether in a user’s social circle or not.

Rationale: Interview participants cited engaging with others who have also experienced a pregnancy loss as one of the most helpful ways in which they were able to move forward after experiencing pregnancy loss. This rationale is also echoed in our secondary research, especially that from Gerber-Epstein et al. as cited in Radford and Hughes, who they found that the best source of support was women who had also experienced a miscarriage [13].

Measure of success: Users make connections with those who have also experienced unexpected pregnancy loss, facilitating conversations about their shared experience as a way to grieve.

5

Priority: Must have

Provide ways for users to memorialize their loss.

Rationale: Our secondary research indicates that memorializing the loss is an important part in the grieving process for would-be parents. From the journal Paediatrics & Child Health, advice for health-care professionals in cases of perinatal loss includes explaining to would-be parents the need and procedure for an autopsy and options and procedures for memorial services. Further, in one interview, a participant indicated that, after experiencing a stillbirth, she used the services of Now I Lay Me Down to Sleep, a 501(c)(3) non-profit organization that offers remembrance photography to parents suffering the loss of a baby, and benefited greatly from this memorialization of her baby.

Measure of success: Users are presented with multiple options that they might take advantage of to memorialize their loss.

6

Priority: Must have

Provide ways to users to make sense of their loss.

Rationale: Secondary research, especially that from Brier's work and Capitulo's work, suggest that if people are able to articulate their "personal legacy of the loss" [9], they may be better suited to share their feelings and thoughts with others, which could increase the level of support they receive from their social circles and families [9] and facilitate expressions of grief [11].

Measure of success: Users can use this solution to help themselves process the early pregnancy loss they've experienced.

7

Priority: Must have — differentiating factor

Avoid "magical thinking" – don't avoid communicating the hard truths about the prevalence and pain of pregnancy loss.

Rationale: One particular interview participant, in recalling preparation for her home birth, read many books that discussed the tendency of women and their families to engage in "magical thinking" during pregnancy, in which everything will go according to plan. Summing up why this is dangerous, the interview participant said, "you really have to think about these things because you need to have some sort of a plan and an idea because things might and will go wrong." An ideal solution would prepare women for the complications that may arise.

Measure of success: This solution's overall tone, both written and visual, provides a sense of realism to users, to the point where users are well-informed about the risk and complications they may experience during pregnancy.

8

Priority: Nice to have

Use dignified, clear, validating language – no niceties.

Rationale: In many cases the messages of sympathy found in pregnancy tracking apps are so incredibly brief, dismissive, meaningless, or irrelevant that there is no sense of acknowledgement or validation for what has occured. These words are ignored at best and at worst offensive.

Measure of success: Our solution has a clear, accessible, and actionable voice, tone, and content guide that provides our team with insight and rules about what words should and should not be used in our solution.

9

Priority: Must have

Don't "reinvent the wheel" – don't include features that are currently well-established in popular pregnancy-tracking periods.

Rationale: Our survey results show that overall, users find pregnancy-tracking apps helpful and respondents specifically enjoy features such as visualizations, symptom trackers and educational articles. When compared with the results from our interviews and feature analysis that demonstrate how apps fail to adequately respond to cases of unexpected pregnancy loss , we can conclude that our focus should be on creating a novel solution to the very present need of addressing loss. Our time would be ill-spent reimagining that are already well received.

Measure of success: Users experience a digital solution that provides services to them distinct from pregnancy trackers. This solution is focused from a content strategy perspective on helping recently pregnant women who have experienced pregnancy loss navigate the difficult times they are going through.

Design Concept

Expectant is an app that helps you tell your pregnancy story.

Each time you open Expectant, you can free write or respond to prompts about your experiences and feelings.

Your journal entries will then be put into a narrative timeline — a way to visualize your pregnancy story. Unless you decide to share these entries, they are visible only to you.

Whether your pregnancy goes exactly as planned, or if the unexpected occurs, we offer resources and peer support to help you through every stage.

Our foremost justification for our design concept for Expectant stems from our secondary research on memorialization and the use of directed journaling in grieving. We wanted to build off of these principles and also include a social aspect for users to connect with other people who have experienced similar loss to further facilitate healing. This is based on our primary research, which indicates that many people who've lost a pregnancy turn to social forums for support. Incorporating all of these aspects, we hope to create a space to facilitate grieving through the creation of concrete experiences and social support for users.

Memorialization

While miscarriage certainly entails a physical loss, it is also thoroughly a symbolic loss as well. Such symbolic losses that are not as concrete or identifiable, such as the death of one's spouse, are more complicated and are characterized by factors that impede the grieving process [20]. Such impediments make typical rituals or stages to grieving inapplicable, as the person experiencing the grief may have an increased capacity for misunderstanding their own identities [20]; for example, a would-be parent may feel uncertain about their role as a parent because they have experienced an unexpected pregnancy loss, which isn't always recognized by social circles or support systems.

By allowing users to record their feelings and experiences, Expectant serves as a way to create experiences that memorialize a user's pregnancy and the lead-up to the life of the child. The concreteness that is developed by virtue of memorialization makes the life of the child less ambiguous because the parent is able to build and reflect on what they had hoped for their child. In turn, this also concretizes the would-be parents' identities because they are building a relationship to with their child through meaning- and memory-making.

Bereavement rituals, while less prescribed in the United States, are often used to assist in the transition to a life without the deceased [21]. A key component to effective bereavement rituals is a transformation phase, "a recasting of the mourners sense of self in relation to the deceased" [22]. Because of the ambiguity surrounding an unexpected pregnancy loss, without concrete experiences to reflect on with the one who is lost, this final step of transformation in one's identity is more difficult to traverse. Memorializing the pregnancy, however, may assist in helping the would-be parent reflect on their identity in relation to their child and, in turn, give them the fodder necessary to transform their sense of self post-loss.

Directed Journaling

In addition to the ritual of memorialization, directed journaling can help would-be parents navigate the transformative stage in the bereavement process. By assisting users through writing their narratives, Expectant can help them explore their thoughts, emotions, and experiences in order to "define and redefine the meaning [attributed to their] loss" [23]. Furthermore, by making their experience of loss externalized through the act of writing, Expectant will allow users to step outside of the loss and see it more objectively with less self-blame [20]. In short, directed journaling may place users in a position where they have the capacity to make meaning out of their loss.

By directing users to create a stories of their experience, it helps them to incorporate the disruptive life event that would otherwise seem incompatible with their self narrative, fostering a stable sense of identity [24]. This type of dialectical thinking helps support meaning-making in understanding and integrating the loss experience into one's life. When directed, the act of writing can help those grieving focus and direct themselves on valuable topics that benefit them in the meaning-making process [24].

Social Support

One of the most salient findings in our primary research was that would-be parents who experienced unexpected pregnancy loss frequently sought the support of some type of community to express their feelings. This trend was first seen in the survey we deployed, where it was indicated that the primary support system utilized by the majority of our participants (52%) was online forums. This was validated through our interviews where participants indicated that online forums, amongst therapy and speaking with family and friends in person, were the most used forms of support.

We will incorporate this sort of social support in our design. Expectant will allow users to participate in discussion forums and create communities where they can share their experiences with one another. Through our interviews, we have come to understand that moderation and maintenance of popular discussion forums associated with pregnancy-tracking apps can be an issue. We are trying to decide how we might create safer spaces for users of these forums, like by allowing only mothers who have experienced a loss access to loss-specific forums. Separation of forums and how to properly moderate them, including whether this is even something we should address in Expectant, are aspects we have yet to set in stone.

Overcoming the Adoption Barrier

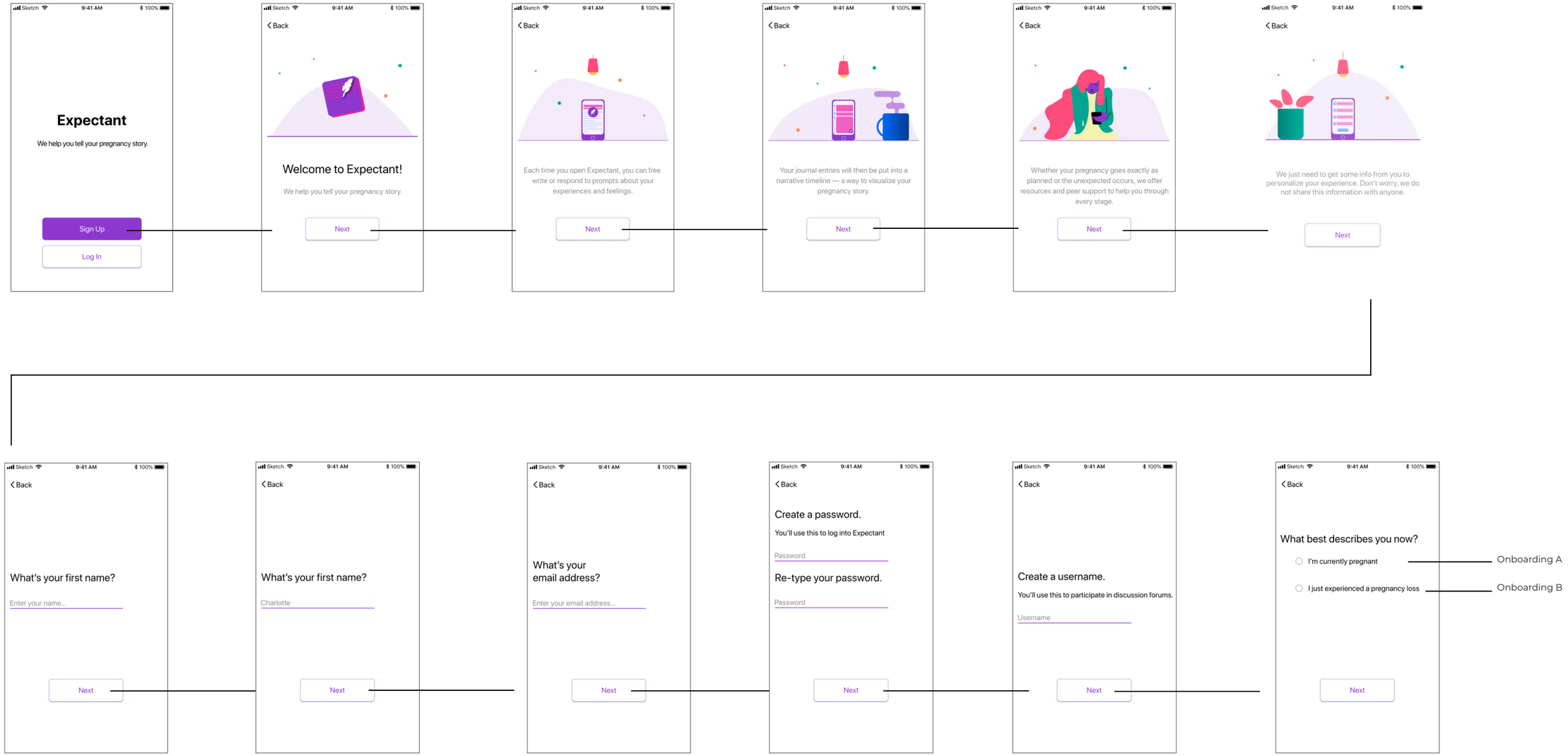
User adoption of Expectant is, obviously, integral to the success of our solution. We had to decide whether Expectant would be an altogether separate app that would-be parents could download after experiencing an unexpected pregnancy loss, an add-on to existing pregnancy-tracking apps, or an app that any would-be parents could use once they knew they were pregnant.

We determined that our solution should have a low barrier to entry and adoption because users may be hesitant to seek out an altogether separate app to address their loss. Accordingly, we decided Expectant should be an app that all would-be parents could use to document their pregnancy journeys — including all the good things in addition to the very real complications that so often occur. Since users will become accustomed to creating regular journal entries throughout their pregnancies, we believe that they will be likely to continue use of the app to document their journey towards healing after loss through journaling.

Expectant

Design Specifications

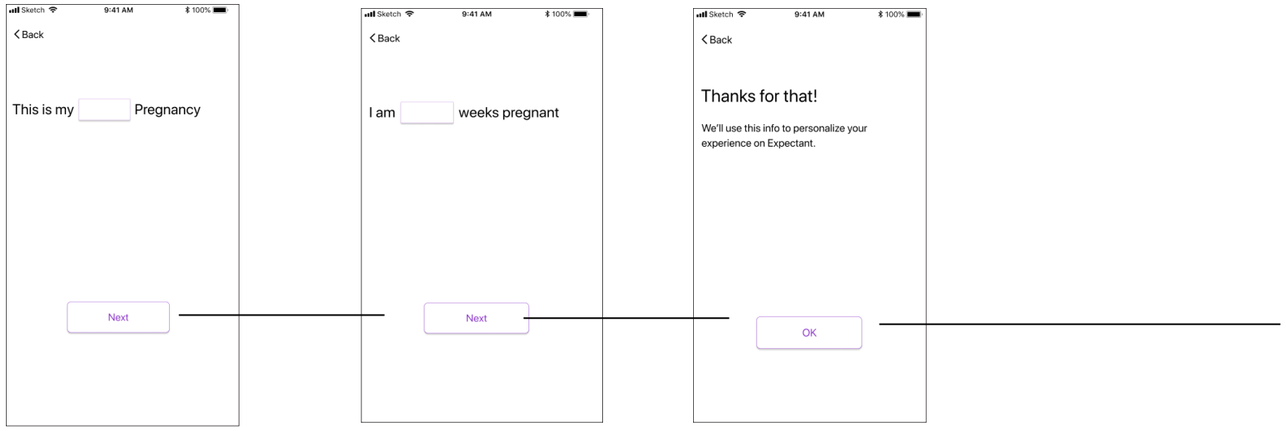
General Onboarding



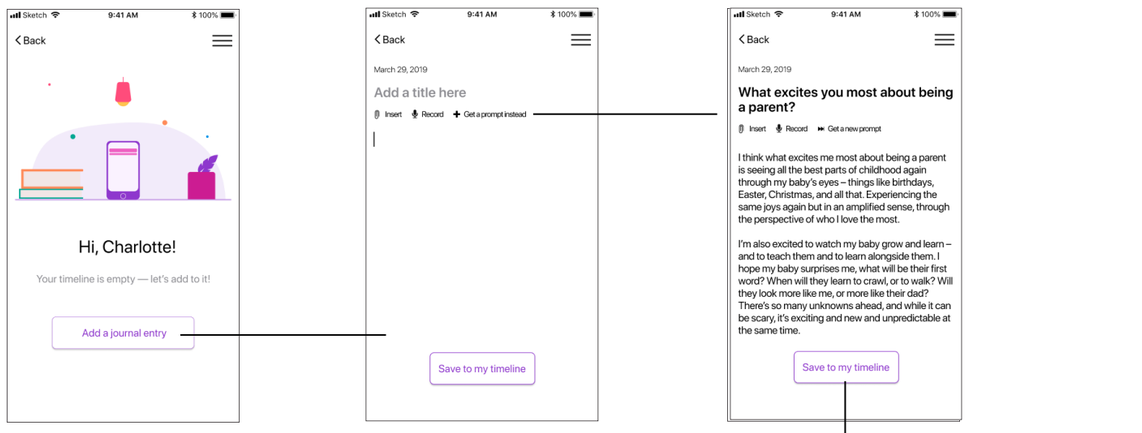
Expectant

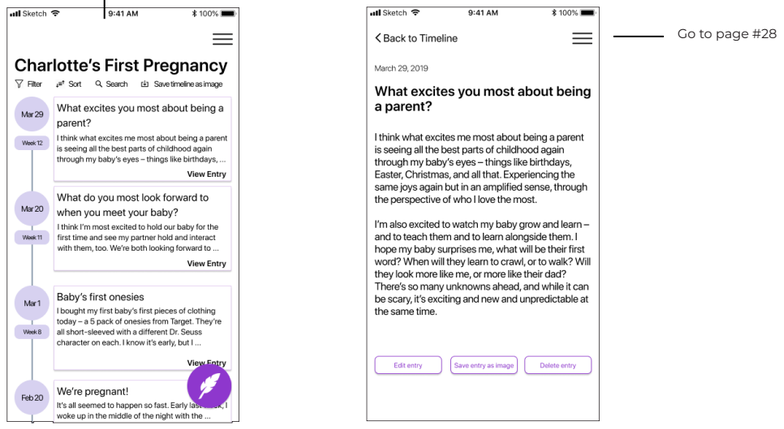
Design Specifications

Onboarding A



Pregnancy Features





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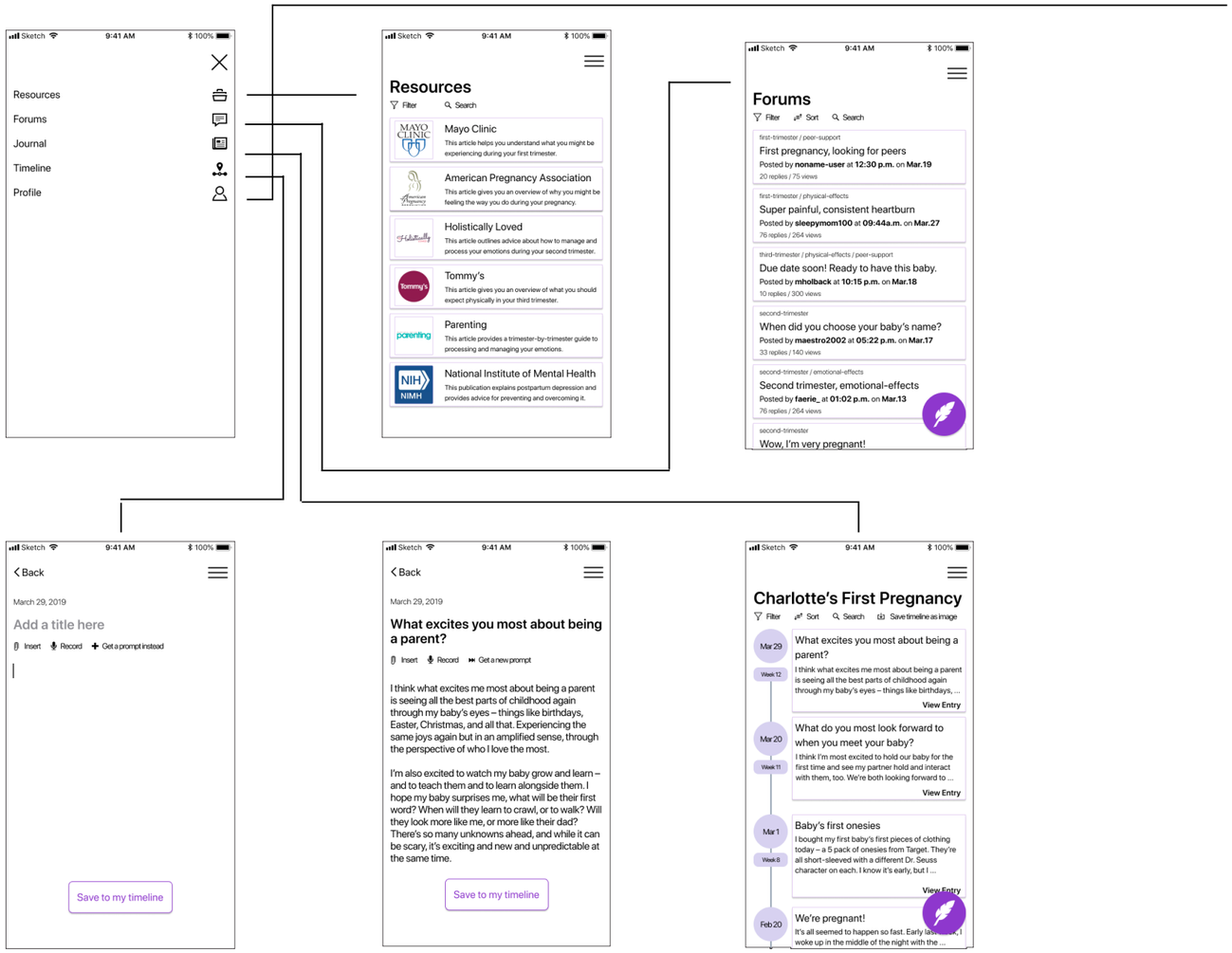
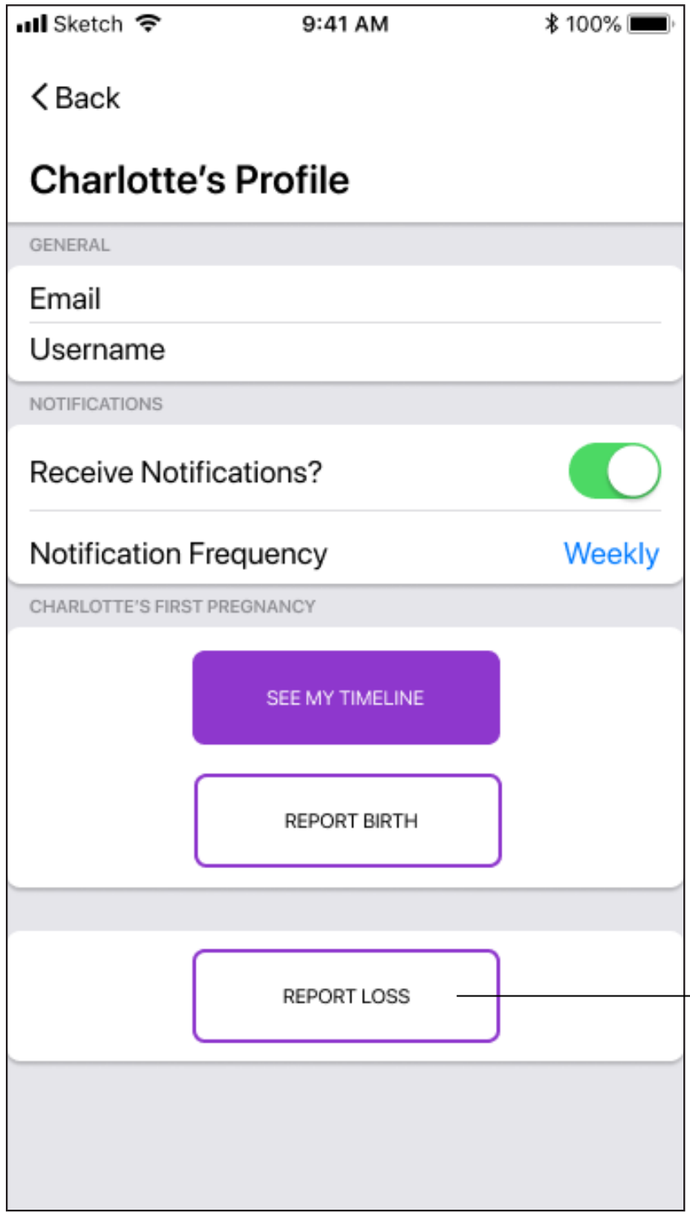
Expectant

Design Specifications

Pregnancy Features (cont.)

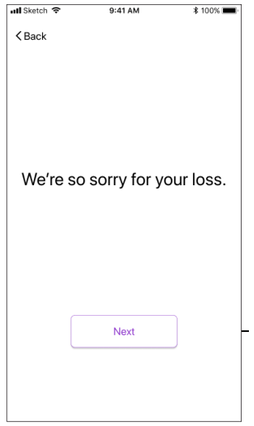


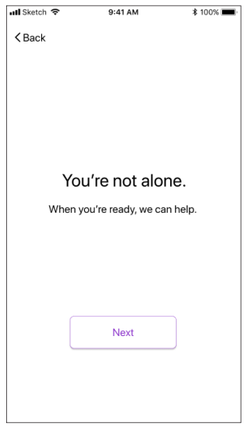


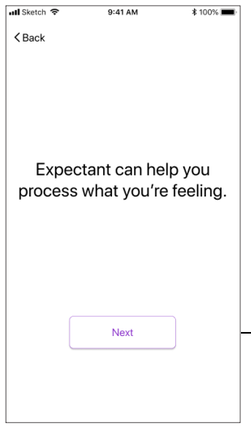
Expectant

Design Specifications

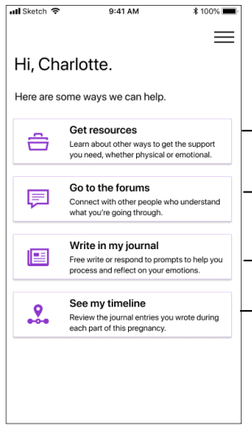
Onboarding B

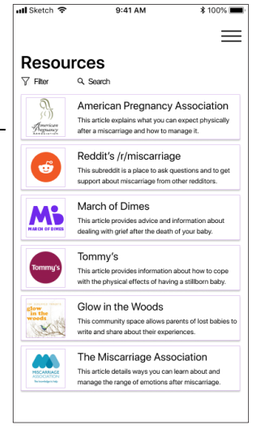


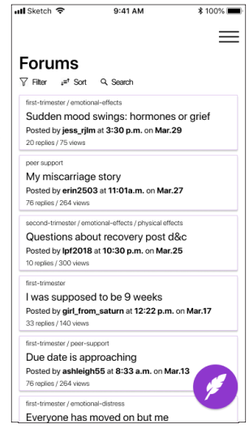


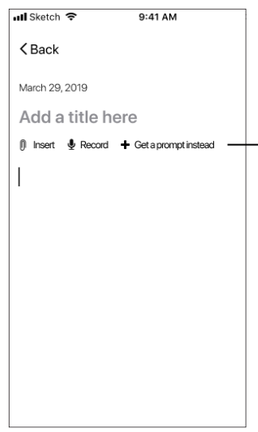


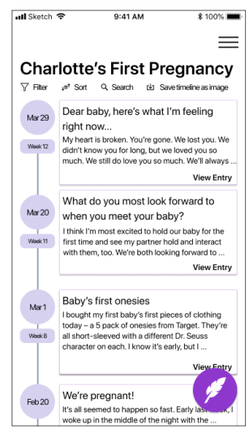
Pregnancy Loss Features











Realization Plan

Design & Research

Further research and design iterations are required to fully test and validate our design conclusions, especially with people who have experienced pregnancy loss. Specifically we would recruit users from our target population to conduct usability testing to assess user expectations and reactions to the design concept. We would continue this iterative process until we were prepared to launch our MVP.

The design process would be highly influenced by a need to conduct clinical trials as well to determine the efficacy of our product. After building a concept product and in conjunction with a research team through a medical organization, such as Michigan Medicine, clinical trials could be conducted to see the results of our intervention. After receiving feedback, changes to the clinical application would also be addressed in new iterations to improve user outcomes.

Development

Product development would begin with a build for iOS because of its higher market share within the United States. Using agile methodologies, research and design goals would be translated to a development timeline, defining the technical architecture and the communication between front and back ends. After building the initial product, various phases of testing would occur to ensure the product would be ready for launch.

After moving beyond product launch and based on market response, expansion to the other platforms, or even possibly web browsers, could begin with new research and design considerations for users on different platforms and outside the United States. Other cultures and countries may respond differently to pregnancy loss, requiring different product strategies.

Partnerships & Funding

Partnerships would be critical to the implementation and realization of our product. Not only would partnerships be required to conduct clinical trials, they would also be needed for the launch of our product. As opposed to launching Expectant alone in the App Store, we believe selling and partnering with health clinics could improve outcomes for product viability. This would allow for wider distribution through partnerships, as opposed to marketing campaigns and advertising to build a user base. Working with partners would also allow for tailoring content to specific target groups and health clinic needs. Funding for the product would thus come from selling a base product to health clinics, allowing them to develop their own “skins” for the Expectant app.

Launch & Future

Launch would begin in phases, starting with partners to get feedback on preliminary results. Partner cooperation would be critical to the beginning phases of the product launch to assist in testing with live users. Once product viability was established with select partners we could begin broadening the market to include other health clinics as well. Development and operation would be established based on new sales and monthly revenue for maintenance. Future expansion could lead to an open launch of a dedicated system on the App Store and the further development of the app to fill other needs as identified.

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