MyDoula: An Interactive Screening and Support System for the Prevention of Perinatal Mood Disorders

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MyDoula
An Interactive Screening and Support System
for the Prevention of Perinatal Mood Disorders

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of the requirements for the degree of

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1.0 ABSTRACT
1.1 Abstract

MyDoula: An Interactive Screening and Support System for Perinatal Mood Disorders

Perinatal Mood Disorders (PMDs) are the leading complication in pregnancies today. They stretch beyond the mother and can affect fathers and non-biological parents or guardians as well. The negative implications of these disorders diffuse out through the family into society as a catalyst for hindered child development, attachment disorders, lower cognitive abilities, and behavioral issues. They often have a profoundly negative effect on the family unit such as causing higher rates of violence, divorce, and loss of work. Parents experiencing mood disorders often have lower compliance rates when it comes to safety measures, such as using child car seats and attending regular wellness visits. Furthermore, these disorders largely go unidentified and untreated due to a combination of social stigma and an ineffective screening process. The proposed system, MyDoula, will address these medical, social, and economic issues by creating a wearable and interactive application platform that will save time and deliver more accurate identification rates to healthcare professionals. As a result, it will provide an opportunity for preventative treatments that can ultimately improve patient outcomes.
1.2 Introduction

There is a gap in mental healthcare of new parents. Perinatal Mood Disorders touch the lives of many new parents yet often go untreated. Identification rates are low, and although these disorders are highly treatable there are many barriers to effective treatment, such as social stigma and a fractured healthcare system. Untreated disorders have a trickle-down effect within society causing a number of negative social and economic implications, including hindered childhood development, behavioral issues, increased levels of family violence and divorce, loss of work, and lowered safety and health compliance among parents (Earls, 2010).

Postpartum Depression (PPD) is the number one obstetric complication in the United States, affecting as many as twenty-five percent of women who come forward for treatment. Unfortunately, only about one-third out of the four million women that give birth each year seek treatment. By the time these cases are caught, they have bypassed the least severe precursors of lesser perinatal mood conditions that affect as much as eighty percent of women in the overall population. Furthermore, those who develop postpartum depression are at greater risk for developing major depression later in life.

Mood disorders are not limited to females or biological parents. The rate of generalized depression in males has risen sixty-five percent in recent years, with five percent of cases identified as Paternal Postpartum Depression (PPPD) (Rosen, 2013.) Adoptive parents, families using a surrogate, and foster parents are also at risk.

The goal of this research is to develop a system of screening and support that couples wearable technology and interactive design to identify the risk of mood disorders among new parents. It also aims to provide the medical and social resources patients need, privately
and without social stigma. Using a combination of biofeedback, push notifications, and self-report data between the user and physician, patients will automatically be screened for risk over time without having to go into a medical office. This combination of data will flag patients at different risk thresholds allowing medical professionals to save time and increase the accuracy of their screening process, being alerted via their e-record when a patient is at risk for mood disorders. Patients will have a private outlet to access treatment and support without the worry of public judgment.

The expected outcome is more accurate identification rates and an increase in the effectiveness of preventative care and the treatment of mood disorders through customized care before they reach dangerous levels.
1.3 Problem Statement

The addition of a new child comes with many physical and emotional changes. There is a gap in the healthcare system identifying perinatal mood disorders and providing de-stigmatized, timely mental health resources for new parents.

Postpartum Depression is defined as depression suffered by a mother following childbirth, typically arising from the combination of hormonal changes, psychological adjustment to motherhood, and fatigue. Those who develop postpartum depression are at greater risk of developing major depression later on in life. However, PPD is not solely limited to women in postpartum, it also affects men and non-biological parents.

Disorders from least to most severe

- Perinatal Depression & Anxiety (Baby Blues)
- Perinatal Panic Attacks (PPA)
- Perinatal Obsessive Compulsive Disorder (POCD)
- Perinatal Post-Traumatic Stress Disorder (PPTSD)
- Postpartum Psychosis/Postpartum Depression (PPD)

Other

- Paternal Postpartum Depression (PPPD)

Signs & Symptoms

- Feeling sad, hopeless, empty, or overwhelmed
- Crying more often than usual or for no apparent reason
- Feeling worried or overly anxious
- Moodiness, restlessness, or irritability
- Anger or rage
- Persistent doubt about the ability to take care of your baby
- Thoughts of harming yourself or your baby
- Insomnia, loss of appetite
- Difficulty bonding with the baby
1.4 Method

The basis for this research incorporates elements of design thinking and design systems with qualitative, ethnographic, and peer-reviewed scientific research. In the Proposal Phase, a comprehensive literature review was compiled inspecting current research regarding the intersection of technology, healthcare, and design. Phase I began with empathetic design utilizing concept mapping, user discovery, and contextual inquiry to create a better picture of the user need and landscape. A system of hypotheses was established to define the problem and the current state of the solution, or lack there of. A series of online surveys were given to a total of 112 respondents, and at least 75 face-to-face interviews have been conducted with parents from a variety of socioeconomic backgrounds, ages, and genders to date. From these findings, the process of ideation and prototyping began using universal methods of design including design ethnography, contextual design, and desirability testing to further develop the interaction of the technology and the user(s).

Hypotheses

H1: Providing private automated screening over time will flag high-risk patients and catch potential issues as they begin to arise.

H2: Identifying mood disorders early will improve patient outcome and support preventative care.

H3: Tailoring information privately will empower independent management.

H4: Using this system will aid medical professionals in more accurate screening and target those at risk, while saving office time.
1.5 Initial Idea

The initial development of this system began in late 2016 based on a prevalent need among parents to recognize the signs, symptoms, and risk of mood disorders. Postpartum depression and other health risks have been prevalent over time. Unfortunately, very few women and their families recognize the signs and symptoms of depression, fatigue, and other health issues in a timely manner. When families come home from the hospital they are often overwhelmed with how to care for their child and, therefore, all the focus is paid to their new baby.

Most of the tools on the market today are infant facing, not parent facing. This means that they monitor daily activities for the infant such as feeding, sleep cycles, and development. Because families focus so intently on taking care of their new infant, the mothers’ well being often slips through the cracks. Small gestures of support are successful in improving the state of the mothers’ mental health. One key to helping new parents is offering specific help at designated times. However, although many people generally offer to help, they may not know exactly what they can do or when to do it. To exacerbate the problem, women who do recognize their change in mental health often try to hide their condition from family and friends out of guilt, judgment, or fear of failure. The Mommy Monitor was a product that meant to fill this gap.

Early on, the proposed system was based on a social networking interaction model. Initially, the Mommy Monitor was a non-invasive wearable to help monitor physiological changes that can lead to serious complications for new moms and alert their designated circle specifically when they need help and suggest specific ways to assist. Sleep deprivation, fatigue, and severe changes in mood and thinking can escalate from normal to dangerous levels if mothers’ and their families don’t recognize and manage the signs
as they arise. Early intervention is key to avoiding the extreme and tragic situations that are reported far too often in the United States.

By sending reminders and alerts to the mother and her designated support system, families can take control over potentially dangerous situations before they happen and work as a cohesive unit to maintain a fully functioning and healthy family. For single mom’s, this is an even more important service. All of their cognitive function is focused on their child, which makes them even more likely to overlook their own health concerns. The monitor would serve as an outside friend that could help them take care of themselves. Alerts could let them know when it is time to reach out for help, remotely connect them with their inner circle, or possibly look into getting treatment from their physician.

A number of physiological markers were explored to see what would best monitor the pain points that arise. Sleep cycles, Heart Rate Variability (HRV), hormonal changes, and breathing patterns were all considered at the outset of the project. In addition to physiological markers, a survey of the wearable market was completed in order to compare devices for cost, effectiveness, and usability. In 2016, the iWatch was a relatively new product, and although it made a splash in 2015 with over 4.5 million dollars in sales, it had not yet reached the market saturation or robust tracking capabilities we see today. People were more hesitant to use biometric tracking, and needed more time to assimilate to new technologies, as well as to where healthcare technology and personalized medicine was about to take them.

After extensive research and user interviews, it was found that a key issue facing this population is the desire for privacy. While the concept still fulfilled a niche in the market, the approach needed to be tweaked in order to meet the needs and the desires of the population. A second issue that arose was changing societal norms. More same-sex, gender fluid, and non-binary parents have begun
to be recognized and accepted publicly. Although these may comprise of edge-cases, they are also a population at very high risk for mood disorders, which adds another layer to the already complicated family situation they deal with when becoming parents. They also represent a largely underserved population. Based on these findings, the interaction and function of the product were reconsidered.

Chart accessed from: https://www.sciencedirect.com/topics/engineering/wearable-technology

Figure 1. Survey of wearable technology
1.6 Idea Evolution & Needs Analysis

Taking into account the sensitive nature of the user population, as well as the changing landscape, contextual inquiry was employed to get a deeper and more empathetic understanding of their wants and needs. This was done through face-to-face interviews and observations in a variety of locations pertinent to a range of personal situations. The result was a deeper understanding of the system interactions taking place between users and providers at the crux of the gap in identification and care.

Rather than focusing on a socialization tool among family and friends, it was found that users preferred a more anonymous option to combat the feelings of judgment they were trying to avoid. Another pain point that surfaced was the issue of time and convenience. New parents are sleep-deprived, busy, and their new baby dictates their schedules; this makes it hard to set appointments, or attend support groups. Beyond scheduling issues, people already suffering from mood disorders are less likely to make and keep appointments.

Pain Points

Social Stigma
The majority of people do not seek treatment because of embarrassment or judgment. Many times they even hide their concern from loved ones due to guilt or a feeling of letting down family and friends.

Fractured System
There is a shortage in professionals trained to specifically deal with perinatal mood disorders, making accessibility to help a challenge.
The screening and education process for those at risk is lacking. This causes the majority of cases to go undiagnosed early on when the condition is treatable.

**Time/Convenience**

New parents are sleep-deprived, busy, and their new baby dictates their schedule; this makes it hard to set appointments, or attend support groups.

People already suffering from mood disorders are less likely to make and keep appointments.

With this new understanding of the user population, a product name change was in order. Mommy Monitor represented all of the pain points trying to be alleviated, sending the wrong message to users. Instead, a deep dive was done into the language around the systems and processes of the perinatal experience. Mind mapping was used to freely associate different words and concepts that would create a more positive and helpful tone. From this, the term Doula arose.

**Definition**

**Doula**

A trained professional who provides continuous physical, emotional and informational support to a mother before, during and shortly after childbirth to help her achieve the healthiest, most satisfying experience possible.

Although a Doula is traditionally there for the mother, they act as a source of guidance and support for the entire family. This proved to be a more fitting term for the service this product would provide. MyDoula is a screening and support system to help the parent along their journey before, during, and after birth, with the goal of wellness management and preventative care.
2.0 RESEARCH
2.1 Comparative Analysis

Currently, the main solution for new parents is support groups. Little attention is paid to creating a mental health plan for parents, and there are few medical resources available. After an extensive search for applications and products specifically geared towards the education, screening, or prevention of postpartum depression and perinatal mood disorders, no products were found that focused on the parent. While there are many depression applications on the market, such as Talk Space, Joyable, and Dr. OnDemand, they all fall under counseling or telemedicine, and do not take into account the specific challenges and risk markers of new parents, nor do they use wearable technology to enhance the functionality of the product.

Informational websites are the leading source of support, followed by traditional support groups. Unfortunately, these approaches lack the flexibility and personalized support new parents need. New parents are busy and sleep-deprived, so they often won't take the time to search through websites. Support groups are a challenge because you tend to lose the anonymity this population requires. They also lack convenience depending on the location and time of the meetings.
2.2 Target Market

Postpartum Depression (PPD) is the number one obstetric complication in the United States. While primarily found in females, males are also at risk. 4 million women give birth every year in the United States. 135,000 children are adopted via the foster system, foreign countries, or relinquished American babies. Over 11 million American women are affected by depression each year. Each of these groups represents underserved populations at risk for mood disorders. Depression is most prevalent in women during childbearing years, but can occur at any age. 25 percent of women who choose to seek help are identified with postpartum depression. However, only a third of the 4 million women at risk choose to seek help. Close to 80 percent of women will experience some sort of perinatal mood disorder before, during, or after pregnancy. This also does not take into account the grossly underserved edge cases.

There has been a 65 percent rise in generalized male depression over the past few years. Many go undiagnosed or untreated because of the stigma of mental health and gender roles. 5 percent of fathers have been diagnosed with Paternal Postpartum Depression (PPPD) in those males who choose to come forward (Rosen, 2013). Few providers screen for male perinatal mood disorders.

Primary User
- Pregnant Women
- Women of childbearing years
- Fathers/expectant father
- Foster parents
- Adoptive parents

Secondary User
- Providers (Physicians, Therapists, Counselors)
2.3 Understanding the Users

After extensive face-to-face interviews and several surveys, a few salient archetypes came to light. At first, the obvious new mother made up the largest user group. However, within this a number of subgroups arose based on different family situations, such as single moms, same sex couples, married or coupled moms, mothers who have lost children, mothers with multiple children, and mothers with children from multiple fathers to name a few. All of these subcategories represent different challenges and impact on the mental health of the mother.

Edge cases were also identified including fathers, same sex male parents, gender fluid, and non-binary parents. Again, these each come with their own set of mental health challenges that put each population at higher risk based on societal attitudes and norms.

Based on these findings, two general personas were created to get a more vivid view of the wants and needs of each user group.

Wants & Needs

Privacy
Anonymity
A source of venting
Rapid delivery of information
Crisis management
Local or tailored resources
Trusted information
Flexibility
Seamless non-obtrusive care
2.3.1 Personas

**Kelly Taylor**  
*second time mom*

"Being a new mom is stressful. I want to make sure I’m being the best parent I can be. It’s hard to adjust to this new life balance and I often feel tired and overwhelmed."

**Profile**
Kelly is a well-educated 35 year old mother of a newborn. She has a bachelors degree in Marketing and is currently on maternity leave from her position at a prominent marketing firm. Kelly is currently going through a hard transition home with her second child. She often neglects herself and becomes pre-occupied with taking care of her new baby. Kelly has a hard time reaching out to others even though she could really use some help. She also feels unprepared for the emotional and hormonal changes she has been going through after having her second child. She never considered that she might be developing a mood disorder.

**Goals**
- Be the best mother she can be  
- Create an easily accessible but private support network to help  
- Learn a better approach to self-care  
- Have access to medical professionals and social outlets for questions and emergencies as needed

**Frustrations**
- Navigating unknown territory  
- Dealing with the unexpected emotional ups and downs of being a new parent  
- Worry of being a failure and feeling alone  
- Not always being comfortable asking for help despite her exhaustion and need for support

**James McCallister**  
*new dad*

“I’ve always wanted to be a father but I had no idea how hard it would be. I want to do what’s best for my family, but I feel depressed and tired all the time.”

**Profile**
James is an accountant who has just adopted his first child. He’s eager to be a good father and partner, but he has had a hard time adjusting to fatherhood. He did not realize he would be going through so many emotional changes. No one prepared him for the physical stress that he is experiencing. James also wants to be a solid support system for his partner without worrying him unnecessarily. He is not sure where to turn to for help or advice about this uncharted territory.

**Goals**
- Learn how to handle his emotions  
- Become a more stable source of support for his family  
- Implement coping strategies  
- Learn more about the health and wellness journey new fathers take

**Frustrations**
- Has unexpected mood swings  
- Feels his emotions are a barrier to being the best father and partner he can be  
- Worry of neglecting his partners needs  
- Not always understanding what he can do to help and when to give his partner space

*Figure 2. Female persona*

*Figure 3. Male persona*
2.3.2 User Narrative

In order to empathize with the user, a narrative was developed based on a variety of interviews with target populations. This user narrative flowed through to the journey map (Fig. 5), providing a synthesis of information and a deeper understanding of the user experience and touch points they might encounter. This user flow served as a sample use case throughout the development of both features and functionality.

User Journey Narrative

This is Kelly Taylor, she’s a second time mom excited to have another child, but she’s also had a hard time recovering from her first pregnancy.

She’s noticed that she hasn’t been her usual self since having her first baby two years ago. She always chalked it up to the normal ups and downs of giving birth. However, now that so much time has gone by, she’s beginning to worry that what she’s feeling isn’t normal.

She’s never had therapy or any sort of mental health screening because she has no history of mental illness, and it never crossed her mind that she might be experiencing signs of a mood disorder.

At her first trip to the OBGYN, she sees an ad in the waiting room for a new product, MyDoula. Upon going into her appointment, she has a brief discussion with her physician about what’s been going on and asks about the product.

While she finds out she’s not yet pregnant, Dr. Zimm does suggest trying MyDoula now in order to give Kelly an outlet for what she’s feeling.
Dr. Zimm also explained some of the key features, such as the tailored content, screening, and access to chat with licensed professionals.

She explained to Kelly that starting now would provide her with valuable information and support that she could continue during and after her pregnancy. It would also provide her with the option to link her profile with any providers she would like in order to ensure proper care and communication between wellness visits.

Kelly loved the idea of anonymous chat since one of her hang-ups is not being comfortable opening up to those around her. She decided to purchase MyDoula as soon as she got home.

Cut to twelve months later Kelly has a newborn, but more importantly, she was able to use this tool to better understand her ups and downs and how to handle them.
2.3.3 Journey Map

Continuing the process of discovery and positioning a journey map was created, roughed out, and then refined to frame the experience and get a sense of touch points (Fig. 4 & 5).

Figure 4. User Journey
Figure 4. Journey Map
2.4 Review of Literature

The scope of research to support this thesis spanned a variety of topics exploring the intersection between technology, design, and medicine.

The main goal was to discover the current system for the screening, treatment, prevention, and support of perinatal mood disorders, postpartum depression, and psychosis. This included the role of technology, design, and implications of privacy.

The focus of this research was structured by the following 7 categories:

1. PERINATAL MOOD DISORDERS
2. SOCIETAL IMPACT
3. HEALTHCARE AND TECHNOLOGY
4. WEARABLE TECHNOLOGY
5. MEDICAL SCREENING SYSTEMS
6. MENTAL HEALTH
7. DESIGN

1. Perinatal Mood Disorders

“Sad Dads: Science Says Men Suffer from Postpartum Depression, Too.”
Rosen, Margery D. Parents, February 27, 2013.

“Postpartum Depression and Perinatal Mood Disorder in the DMS”
Lisa S. Segre, Ph.D. and Wendy N. Davis, Ph.D.
https://www.postpartum.net/professionals/postpartum-support-international-the-dsm5/. Accessed August 11, 2018
In the DSM 5 the diagnosis of depression during postpartum period still utilizes the onset specifier format.
Currently, it only recognizes diagnose in the first four weeks following birth. This leaves a gap in the system due to the fact that most wellness checks don’t occur until week six. Postpartum Support International is fighting to expand the diagnosis window to a full year after giving birth. They also argue that symptoms can occur even before giving birth.

2. Societal Impact

“Incorporating Recognition and Management of Perinatal and Postpartum Depression Into Pediatric Practice.”

According to the Academy of Pediatrics, depression is the most under-diagnosed obstetric condition in America. Over 400,000 infants are born to mothers who are depressed which leads to larger complications ranging from higher medical costs, inappropriate medical care, child neglect, family dysfunction, and adverse affects on early brain development. Both maternal and paternal depression affects the entire family. Estimated rates of postpartum depression vary based on income and age.

“Why Are Our Healthcare Systems Failing Postpartum Moms?”

Canadian and U.S. healthcare focuses almost exclusively on the baby, to the point that the postpartum health of their mothers is seriously neglected...
3. **Healthcare and Technology**

“Web-Based Interventions for Prevention and Treatment of Perinatal Mood Disorders: A Systematic Review.”


Lee et al. conduct a systematic review of web-based interventions for the prevention and treatment of mood disorders during postpartum. The period defined spans from the start of pregnancy to 1 year after giving birth. Despite the high rates of underlying depression, very few women reach out for professional help. Issues include physical and attitudinal barriers, long waiting times for face-to-face therapies, scheduling issues with group therapies, social stigma, and potential risks of pharmacological interventions while pregnant or breastfeeding. Computerized Cognitive Behavioral Therapy (CCBT) has proven an effective treatment for general depression. Based on these findings and the current barriers facing the accessibility of treatment, Lee states “A CCBT resource for the self-management of perinatal depression could therefore represent an efficacious, accessible, and economically sound resource.” This would provide anonymity, flexibility in scheduling, and can be adapted to different languages, cultures, and needs. Although they found that web-based interventions might be very effective, further research is needed.

4. **Wearable Technology**

“Wearable Technology in Medicine and Health Care”

Serhat Burmaoglu, Vladimir Trajkovic, Tatjana Loncar Tutukalo, Haydar Yalcin, Brian Caulfield, Chapter 14 - Evolution Map of Wearable Technology Patents for Healthcare Field, Editor(s):
This chapter provides an overview and evolution map of wearable technology. It discusses the medical use of wearable technology, and the rapidly growing market. The chapter lays out the range of different wearables and their content categories by sector.

5. Medical Screening Systems

“Universal Screening for Postpartum Depression: An Inquiry Into Provider Attitudes and Practice”


Delatte et al, address the use and practices of providers with regard to the Edinburgh Postnatal Depression Scale (EPDS) during the 6-week postnatal routine check-up. It noted that although many providers do not document the use of the EPDS, they feel confident in diagnosing PPD and other mood disorders. Although the Department of Obstetrics and Gynecology instituted a new program to ensure universal screening of PPD in 2006, providers are not complying. This study identified a gap in what providers know should be done and what is actually being done in postpartum visits.

6. Mental Health

“Universal Screening for Postpartum Depression: An Inquiry Into Provider Attitudes and Practice”

Delatte et al, address the use and practices of providers with regard to the Edinburgh Postnatal Depression scale and their responsibility for screening.

7. Design

“Hooked: How to Build Habit-Forming Products”


Eyal discusses the four-step Hook Model for developing habit-forming products in technology. He outlines the hooked cycle and how to employ it in product development.
2.5 Current Landscape

Screening

According to the American College of Obstetrics and Gynecology, Personal Health Questionnaires are to be administered at every wellness visit or point of contact a mother has with her providers. Unfortunately, this does not always happen. When administered, PHQs screen at a range of 93–97 percent accuracy in assessing risk of mood disorders (Fig. 6). Prior to giving birth, women are generally not screened other than the physicians’ natural instincts during interactions with the patient. This also does not include screening males. Although there is an effective approach to screening when used, there is a fracture in the system screening in a timely and regular manner.

Diagnosis

The DSM 5 only recognizes Postpartum Depression as a subset of generalized depression within four weeks of giving birth. The other differentiator is anxiety. One way to measure anxiety levels is through Heart Rate Variability (HRV) over time. Because post-birth wellness visits typically occur at week six, this leaves room for many people to slip through the cracks.

Treatment

When a diagnosis of PPD is made there a few approaches to treatment. Most commonly, psychotherapy or counseling is recommended. Depending on the severity or underlying cause of symptoms, hormone therapy or antidepressants may also be used. Cognitive Behavioral Therapy (CBT) and Dialectical Behavioral Therapy (DBT) are both very effective in the treatment of PPD.
Figure 5. Personal Health Questionnaires (PHQs)
3.0 DESIGN PROCESS
3.1 Ideation & Iteration

Based on the research gathered about users and the general treatment environment, a series of sketches was done to ideate an improved system that meets the needs of a variety of target groups. Several main components were identified in order to develop the structure of the solution. The main component categories included screening, support, treatment, and resources.

**Wants & Needs**

**Screening**
Physiological tracking and self-report data

**Support**
Venting and chat capabilities with trained professionals using currently accepted systems

**Treatment**
Link to providers via e-records

**Resources**
Personalized resources gathered for each user to be convenient and accessible.

*Figure 7. System Ideation*
3.2 The System

Personalized Healthcare

MyDoula uses universally accepted methods in order to enhance current systems. Personalized Health Questionnaires (PHQs) are administered through push notifications to aid in screening every 2–3 weeks capturing a history of self-report data over time.

Plugging into the existing technology of the iWatch series 5, Heart Rate Variability (HRV) is passively gathered to monitor anxiety levels alongside the PHQ self-report data. The presence of anxiety acts as a differential marker between generalized depression and postpartum depression. This information integrates with current medical channels, such as MyChart, to flag e-records if the risk level reaches a certain threshold.

Curated Content

All support resources provided are based on the user location and profile to ensure right providers and support are accessible. Articles are all screened and approved by a pool of licensed professionals to provide the highest standard of care. They are then summarized into abstract versions of the full text, and filtered by MyDoula to fit the users personal profile needs. Profiles are developed based on a combination of answers to the initial screening questions and risk level for disorders based on the HRV and PHQ data.

Accessible 24 Care

MyDoula offers anonymous chat, support, and a link to crisis care regardless of the time, when you need it most. A pool of licensed professionals trained in counseling and crisis management is there to listen and advise. Biometric tracking over time helps flag high risk-situations to identify systems before they escalate, sending a flag to the chart of any linked providers resulting in more timely recognition and treatme
Figure 8. System Interaction
3.3 Prototypes & Wireframes

A series of sketches were made to get a feel for the key features and how to best make them accessible to users. From there, paper prototypes were developed and tested with users (Fig. 9).

*Figure 9. Sketches & Paper Prototypes*

Using these prototypes as a jumping off point, the flow of the wireframes was developed to find the most straightforward way to highlight particular interactions such as chat and crisis care. Based on the fact that new parents are generally distracted, the goal was to make access to care as simple and as seamless as possible (Fig. 10).

*Figure 10. Low Fidelity Wireframe/Flowchart*
During the onboarding process, there is a brief series of questions that build the initial profile. This is where age, family situation, and gender among other things help to filter people into archetypes specific to them and their needs (Fig. 11). Users can go back into their profile and update answers to these questions at any time. They may also skip this during initial onboarding and go directly into the application. These answers, along with the anxiety over time and self-report data, will generate their risk assessment and drive what article content and positive reinforcement is sent (Fig. 12).

From the home screen, users can access a variety of curated content that was handpicked for their situation. By providing a pool of professionals to screen information, users can be assured that the information provided is legitimate and specific to them. When a user clicks into one of the articles, a Cliff Notes version of that article will appear with highpoints of the article. This allows for rapid information delivery. If the user should choose to learn more, they may click through to the full-text article in our curated library of content.

Figure 11. Initial Screening Process
The MyDoula chat feature provides privacy and anonymous chat with licensed professionals trained to counsel those at-risk for mood disorders. This provides an immediate outlet for users when they need guidance (Fig. 12). Users also have the option to start a journal entry if they prefer to vent privately. All conversations and entries may be deleted or saved based on user preference to give a sense of anonymity.

Figure 12. Features
Figure 13. Home Screen Overview

Figure 14. Wearable Integration
Curated Content

1. MyDoula uses a combination of your initial screening answers, self-report information and biometric data to customize the articles generated specifically for you over time.

2. All articles are screened by licensed professionals for your changing needs and are updated on a regular basis.

3. A brief synopsis provides the highlights of each article with an option to click through to the full-text in order to save you time and deliver rapid information.

Figure 15. Curated Information Interface

Integrated Care

1. MyDoula can be fully integrated with MyChart in order to connect all of your pertinent providers. Linking offices provides an opportunity to flag your chart and send appointment reminders.

2. Providers may also be added manually or not connected based on preference. Providers only see what you want them to see, your chats and journals stay private.

Figure 16. MyChart Integration
3.4 Color Study

Color is an important element in tying together the look and feel of MyDoula. The color palette is meant to reflect the feeling and function of the services provided.

Keywords/Ideas
- Cool
- Calm
- Soothing
- Trustworthy
- Unisex
- Ethereal,
- Non-gender specific
- Optional pops of color.

Figure 17. Color Study
3.5 Type Study

A variety of fonts were considered for use in the logo and the application. Based on tone and language established with the name and color palette it was important to further reinforce the mood via typography. The chosen type needed to be friendly and trustworthy, with easy readability.

**Body Text & Tagline**
Museo Sans 700

```
abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
1234567890
```

**Headers & Captions**
Museo Sans 900

```
abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
1234567890
```

**Alternate Weights**
Museo Sans 100
Museo Sans 300

*Figure 18a. Type Study, Copy & Site*
Figure 18b. Type Study, Application
3.6 Logo

<table>
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<tr>
<th>Formal Script</th>
<th>Informal Script</th>
<th>Handwritten</th>
<th>San Serif</th>
<th>Serif</th>
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</table>

*Figure 19a. Logotype Study*

**Tagline Development**

Let us connect your village
Connect your village
Connect with your village
Connecting a support system for new mother’s
Making support seamless
Making support seamless for new mother’s
Connect and support
Connecting the ones you love
Connect your inner circle
Figure 19b. Tagline Development
Figure 19c. Logo Development
3.7 Final Visual Solution

Figure 20. Final Logo
3.8 Final Solution

The final solution incorporates existing technology via the Apple iWatch to track HRV and send PHQ push notifications, alongside a more robust interactive application. The iWatch component passively gathers physiological data and acts as a conduit to the phone application. Interactions with the watch are unobtrusive and PHQ pushes are only sent every two to three weeks.

Tailored information, geo-tracked resources, and quick link to chat with licensed professionals is found on the home screen of the application. In order to account for privacy, MyDoula is HIPAA compliant, and all conversations or journal entries can be deleted at any time. This allows users to vent and receive advice with the peace of mind that they are not being judged. An emergency button is also found on the top of the screen in order to get immediate access to the Crisis Text Line when in need of crisis care. Users also have the ability to link to their providers via MyChart at any time in order to report their results.
4.0 CONCLUSION
4.1 Conclusion

Postpartum depression affects millions of people in the United States each year, yet often times goes untreated due to gaps in the healthcare system, fear of societal norms, and a lack of education about the signs and symptoms to be aware of. For those who do attempt to get help, they come up against barriers such as a lack of training or available providers. Perinatal mood disorders can be effectively treated when caught early, preventing escalated conditions such as PPD and Postpartum Psychosis.

The key to getting help to those that need it is to create a system that will fold into their daily lifestyles as an adjunct tool to their usual wellness and preventative care measures. With MyDoula, parents are able to conveniently get the screening, care, and connect to the treatment they need. Catching conditions early and addressing them as they arise will contribute to more preventative outcomes amongst the population. Seamless screening and linking to providers saves office time, and increases the provider’s ability to more accurately diagnose and treat their patients.

MyDoula uses existing systems that are currently accepted in the medical community, such as PHQ screening, physiological data points, and real-time therapeutic support. Through this, parents are able to take control of their emotions and better understand what they are going through. Everything is at their fingertips so they don’t have to push through the barrier of traveling to a location in order to get help, or face the perceived social stigma of admitting they have weaknesses. With MyDoula users get integrated preventative care on hand. Furthermore, because MyDoula is based on accepted medical systems for generalized disorders, the root of the product can be refaced to deal with other gaps in mental health care in communities, such as Veterans with PTSD, the LGBTQ community, and teens at risk for emotional disorders.
4.2 Summary

*Rooted in Scientifically Accepted Approaches*

Self-report Data: PHQ Screening
Differential Diagnosis (anxiety)
Physiological Data:
Biometric Feedback (HRV)

*Connects a Currently Fractured System*

Real-world integration with existing systems
Automates proven methods
Provides preventative care through personalized medicine
24 access to licensed professionals and screened information

*Alleviates Current Pain Points*

Privacy removes the stigma from seeking help
Improves screening process
Makes help more accessible
Bibliography


Segre, Lisa S. Ph.D. and Wendy N. Davis, Ph.D. “Postpartum Depression and Perinatal Mood Disorder in the DMS” https://www.postpartum.net/professionals/postpartum-support-international-the-dsm5/. Accessed August 11, 2018

