2016

Personas: A Strategy for More Inclusive and Usable Reproductive Health Tracking Technologies

Anna R. Paul
Michigan Technological University, arpaul@mtu.edu

PERSONAS: A STRATEGY FOR DESIGNING MORE INCLUSIVE AND USABLE REPRODUCTIVE HEALTH TRACKING TECHNOLOGIES

By

Anna R. Paul

A REPORT

Submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

In Rhetoric, Theory, and Culture

MICHIGAN TECHNOLOGICAL UNIVERSITY

2016

This report has been approved in partial fulfillment of the requirements for the Degree of MASTER OF SCIENCE in Rhetoric, Theory, and Culture.

Department of Humanities

Report Advisor: *Ann Brady*

Committee Member: *Karla Kitalong*

Committee Member: *Marika Seigel*

Department Chair: *Ronald Strickland*

ACKNOWLEDGMENTS

I am deeply grateful to Dr. Ann Brady, who provided me with guidance and mentorship throughout my course of study. I consider myself fortunate to have worked with an advisor who modeled what it means to be a good feminist, technical communicator, educator, and advocate.

I would also like to thank Dr. Karla Kitalong and Dr. Marika Siegel for their extraordinary support over the course of this project.

I was fortunate to be a part of a cohort of scholars who created a supportive space to explore new ideas and make connections. To Kim, Silke, Kirsti, Joel, Heather, Aranya, Shelly, and all the others, thank you.

This work would not be possible without Andy, who always reminded me that a graduate education was an important investment I made in myself.

I am also grateful to my parents, who emphasized the value of an education and hard work.

And finally, a special thanks to Leanne, for helping me eliminate my unnecessary prepositions and for the weekly Sunday calls that helped keep me sane.

Abstract

In this report, I argue for the inclusion of personas in the development process of technologies that are designed to allow users to collect and track their health information. Personas provide a profile of a user and their needs, goals, and contexts. This tool can help designers to better understand their users, in order to create better, more usable end products. I examine one particular self-tracking technology, smartphone applications that allow users to record information about their menstrual cycles. Many of the most popular period tracking applications available today only meet the needs of a narrow user group, resulting in a technology that is unusable for certain populations of users. In this project, I collect data from individuals who had attempted to use period tracking technologies in the past, but felt they were unable to manage the information that was important to them. Using Lene Nielsen's Engaging Personas approach, I crafted three personas that reflected the needs and goals of these users. This project serves as a model for developers of period tracking applications and health-tracking technologies more broadly.

Purpose Statement

This project is concerned with helping developers of self-tracking health technologies better meet the needs of their users and to identify the needs of potential users. I argue for the inclusion of personas in the development process of technologies that are designed to allow users to collect and track their health information.

Personas refer to descriptions of fictitious, yet plausible, users that are created based on real user (or potential user) data. Personas are a tool that can help developers to create a complex, tangible model of users, who might otherwise seem abstract or one-dimensional (L. Nielsen, 2013). Especially in regards to health-tracking technologies, there is great variety in how the data collected should be analyzed and displayed depending on *why* the user is collecting this information and *how* they plan to use it. Personas can help designers to capture this *why* and *how*, allowing them to create products that address the user's situation and motivation.

Due to the limited timeframe and scope of this project, I consider one specific technology: smartphone applications that are designed to allow users to track menstruation. This particular technology will provide a productive site of inquiry because it provides several challenges for creating user-centered technology, particularly the possibility of misalignment between the developer's perception of users and the users' realities. My own heuristic evaluation of several popular period tracking apps for the leading smartphone platforms (Paul, 2015) has led me to believe that developers have created these technologies based on the following assumptions:

- Users will be biological females who identify as women
- Users' motivation for using the technology is to achieve pregnancy
- Users engage in stereotypical feminine values and pursuits

As a result, these applications only truly meet the needs of healthy, sexually active, heterosexual, cisgender women who are trying to become pregnant. While some users may fit this profile, there are likely many other users (or potential users) who do not. I hypothesize that those who do not match this demographic might actually be more inclined to track their periods because they differ in one or more of these characteristics. Examples may include:

- Women with medical conditions that impact their periods
- Non-normative individuals for whom menstruation is a biological reality
- Young or older women who are experiencing changes in their cycles

If developers fail to understand and address the needs of these varied users, they risk the continued creation of applications which only meet the needs of the same limited group, while failing to account for users who do not match this profile or have different needs and motivations. This project frames personas as a method for avoiding these pitfalls by providing developers with access to the information they require to address the needs of varied users.

Project Justification

This project addresses the usability of health-tracking technologies to help developers of these technologies to better meet the needs of their users and to identify the needs of potential users. Although tracking health data is not a new phenomenon, recent advancements in both hardware and software have made self-tracking devices and programs (technologies that allow users to input certain types of data in order to quantify and measure their health) more affordable and portable. This has led to an increase in the popularity of movements that encourage users to collect their health information as a means of self-surveillance and self-discipline (Lupton, 2014). This project speaks particularly about technologies that are used outside of an institutional medical context. In other words, while information collected by these technologies might be informally shared with healthcare providers or used as tools to attempt to comply with medical advice, they are not considered medical-grade devices nor do medical professionals prescribe them for use. These might include, but are not limited to smartphone or other portable device applications, websites, or wearable fitness tracking devices.

While the use of personas should not be limited only to these health technologies, they are particularly needed and useful within these contexts. These products have wide target audiences that have the potential for great amounts of diversity since these technologies are designed to allow users to gather general, rather than specialized, health data (such as steps walked, heartbeats per minute, or the frequency or qualities of bodily functions). However, there is great variety in how the data collected should be analyzed and displayed depending on *why* the user is collecting this information in the first place and *how* they plan to use the information once they receive it. Personas can help designers to understand this *why* and *how*, allowing them to create products that address the user's situation and motivation. They can also help developers to recruit usability test participants that better match their users, adding valuable contributions through iterative testing.

For this project, I have crafted personas for one particular technology: smartphone applications that are used to track menstruation. These applications are a productive source of inquiry because they provide additional challenges for creating user-centered technology. Although there have been many efforts to recruit and retain women in app and software development, the field still remains largely male-dominated (Kozlowski, 2012). Additionally, the economic, material, and functional barriers to creating applications have decreased dramatically over the years. As a result, development has become less profitable as the market has become flooded with applications (Wilcox & Voskoglou, 2014). Developers have been incentivized to churn out a large variety and quantity of apps, most with small budgets and short timelines, in the hopes that one or two might be wildly popular. For these reasons, it may be difficult for developers to include and collect input from users as they create these applications.

Personas may be one efficient and cost-effective way to help developers understand *why* the user is motivated to use the product and *how* they plan to use the product, especially at key conceptual stages (Baek et al., 2008). Without user participation, developers must rely on their own assumptions of their users' *why* and *how*, based on their own personal judgments, or by considering the ways that similar existing technologies have identified and addressed user's needs and motivations. In the context of menstruation tracking apps, there is a clear possibility for misalignment between a developer's perception and the users' realities. In the case of period tracking applications, there is the risk of the continued creation of applications that only meet the needs of healthy, sexually active, heterosexual, cisgender women who are trying to become pregnant. These technologies would fail to account for users who do not match this profile or have different needs and motivations.

Previous Work

One of the first steps to creating a product that meets the needs of current and potential users is to understand the existing market (in other words, whose needs the existing technologies address and what the technologies perceive as those user's needs and motivations). In the context of menstrual tracking applications, developers would collect, purchase, or otherwise access demographic data about users who have downloaded and used similar applications available on the market (Min, 2016).

Because of the various limitations (budget, time, access to data, etc.) of this project, I chose instead to draw on my previous analyses of these technologies. My own examination of several popular menstruation tracking applications can provide an overview of what the designers of some of the most widely used period-tracking apps perceive as their users' needs and motivations. To do so, I used articulation theory, a method borrowed from cultural studies that considers the way elements of a text may "go together" (Seigel, 2013). Articulation theory allows researchers to understand how meaning is created by considering which elements are connected in ways that create meanings and identities across networks (p. 23), which would include developers, users, and the applications.

My analysis of the design and marketing material of three of the most widely used period tracking applications allowed me to identify the assumptions about the menstruating body that are embedded into the design and functionality of these smartphone apps (Paul, 2015). Developers choose to incorporate certain interfaces and features based on their perception of their users and their users' needs. Thus, an examination of these technologies might serve as a way to reveal how developers conceptualize their users (p. 11).

My findings indicated that the applications' marketing material, which included the developer-provided content for the application's product page in each platform's respective app store, advertised the technology as a tool for women to quantify and

track ovulation and fertility throughout the menstrual cycle (Paul, 2015, p. 12). Further, the free and "lite" versions of the applications prominently featured advertisements for pregnancy tracking technologies (p.13). The applications also articulate the users as aligned with values and pursuits that are traditionally considered feminine. The visual elements of the interface most often feature floral iconography in hues of pinks and purples. Alternate themes include similar designs featuring makeup and jewelry (p. 17).

Thus, my rhetorical analysis of leading period applications supports my assertion that developers created applications that functionally and aesthetically met the needs of users they presumed to be healthy, sexually active, heterosexual, cisgender women who are trying to become pregnant. Although it might be possible for some users to negotiate their own use of these applications in accordance with other needs or motivations, such as to track changes in their menstruation in conjunction with a medical condition or to learn their own cycle, these applications were not built with these functionalities in mind because these developers did not design the technology to meet the needs of these users.

It's unlikely that any developers of current period tracking applications have incorporated rhetorical analysis or have considered applying articulation theory as a part of their development process. Most often, those who are performing market research in the early stages of development might often collect and compile a variety of quantitative measures about users, including demographic information, to better understand who uses, or might use, a similar product (Min, 2016). Like personas, my analysis consists primarily of qualitative data. However, I argue these methods, and the findings that result from them, provide relevant and meaningful contributions to understandings of this technology. Consider that, in most statistical (quantitative) analyses conducted and even within usability testing, data about users who are considered outliers is often eliminated from the data set because of the potential impact on averages (J. Nielsen, 2006, para. 6) and to assure that findings can be considered significant. In order to capture information lost from the erasure of outliers (which in this case might include users who do not fit into the target demographic described above) qualitative information must supplement quantitative data (para. 5), and I do so through my previous rhetorical analysis and with the incorporation of personas.

Research Questions

This project considers the following questions:

- How might the inclusion of personas help developers of applications designed to help women track menstruation better understand user experience and better meet the needs of their users?
- In the context of menstrual applications, what might these personas look like?

More broadly, this project will contribute to the following scholarly conversations:

- How might personas be used to produce health-tracking technologies that better meet the needs of current and potential users?
- How could the incorporation of personas into product development help developers to better how understand how and why their users use these technologies?

Methodology

Feminist Standpoint Theory

This project is framed by Feminist Standpoint Theory, which argues knowledge is "socially situated" (Harding, 1991, p. 119). This approach is concerned with the way that one's identity or position within a society creates opportunities for communities to value, or devalue, the knowledge that an individual creates (p. 121). Those who are situated outside of dominant social groups have the possibility for awareness and knowledge that might not be available to those who are aligned with more influential institutions (p. 125). Thus, difference should be acknowledged as a source of knowledge and new perspectives, as contributions that expose and fill in gaps in our understanding.

Twenty-five years ago, Sandra Harding argued Feminist Standpoint Theory was a powerful tool to raise awareness to and combat the way women's contributions to science were often dismissed by the men who dominated the institution. In this project, I apply Harding's argument and the Standpoint Theory framework to the context of period tracking applications. Here, women who make up this dominant group (identified in the sections above as healthy, sexually active, heterosexual, cisgender women who are trying to become pregnant) have had their knowledge and experiences about their bodies validated, and as a result, this knowledge has been integrated into period-tracking applications. Those with other knowledge and experiences have not had the opportunity to make contributions to these technologies. Thus, this project aims to use the lives, knowledge, and experiences of these other groups as a starting point to consider these period tracking applications, and resisting historical patterns of "exclusion from the design and direction" (p. 124) of health technologies more broadly. Here, personas function as a tool for capturing and incorporating these voices. Standpoint Theory is explicitly enacted in recapturing the voices that might otherwise be considered as outliers.

User-Centered Design

My work is also informed by User-Centered Design, an approach that emphasizes the people who use technologies rather than the technological systems that produce technologies (Johnson, 1998, p. 12). According to Johnson, User-centered Design asks us to reject previous understandings of knowledge as hierarchical - handed down from experts to users - and disrupting notions of a "expert/novice binary" that privileges a

designer's "expert" knowledge while undervaluing or discounting knowledge generated by users of technologies. Rather, designers must involve users in the development and testing of technologies. Because users "understand technology from a unique perspective constructed from knowledge of practice within certain contexts" (p. 10), user-centered tools call for a particular attention to the situation and experiences in which users and technologies reside. Thus, users are recast as active contributors and co-creators in the design and development of processes rather than passive recipients of expert knowledge who must accommodate themselves to technology.

In this project, personas become important tools of User-Centered design that facilitate the transmission of user knowledge to designers of period-tracking applications. The persona profiles combine and contextualize common user experiences in terms of users' *why* and *how*. Additionally, because the information collected from users asks them to reflect on their past interactions with similar technologies, these personas draw on a collective "knowledge of use" (p. 13), acknowledging users as contributors of "valuable knowledge of the systems which they are a part" (p.57).

Critical Imagination

I also use feminist scholars Royster and Kirsh's concept of Critical Imagination. Engaging in the practice of reclaiming the voice and stories of people who are not able to speak for themselves, Critical Imagination asks scholars to consider explicit primary sources and available methodologies (Royster & Kirsch, 2012, Location 950) in conjunction with implicit contextual understandings of the rhetorical situations in which the subjects of inquiry reside (Location 1013). Although Royster and Kirsh use Critical Imagination to consider the lives of historical women (Location 950), I extend this methodology to those whose narratives about their own about their own bodily experiences have gone unheard by developers of reproductive health technologies today. This fits well with the authors' goal of a Critical Imagination methodology, which they articulate as "look[ing] beyond typically anointed assumptions in…anticipation of the possibility of seeing something not previously noticed or considered" (Location 950). Ultimately, this methodology will allow me to "gain a more robust capacity to reach insights, chart productive pathways for sense making and knowledge making, and identify patterns for enhancing, extending, and…invigorating knowledge and understanding" (Location 1081).

A persona is crafted using information from multiple users or potential users. Because this data is combined into a single representative profile, it is important that the personas crafted for this project reflect the "spirit" of these users and their experiences, moving beyond "what we 'know'" (Location 950), which would include the explicitly stated information shared by interviewed users. To do this, I imagine users within their own contexts and rhetorical situations in order to better understand and reflect their realities, a vital step to creating dynamic and engaging personas that communicate real users' needs and experiences.

Literature Review

Personas were first proposed by Alan Cooper in his 1999 work *The Inmates Are Running the Asylum: Why High-Tech Products Drive Us Crazy and How to Restore the Sanity*, emerging from software development as a way to identify specific user groups and their needs. Although the persona's predecessors –archetypes, user models, and lifestyle snapshots (Nielsen, 2013) were used sporadically, Cooper popularized personas as a user-centered design tool. Since then, personas have been applied to the development of goods, services, and processes and adopted in various contexts, including: human factors and ergonomics (Brangier & Bornet, 2011; Nieters, Ivaturi, & Ahmed, 2007;), computer-human interaction (L. Nielsen, 2013; Pruitt & Adlin, 2012) and marketing (Juon, C., Greiling, D., & Buerkle, 2011; Min, 2016).

In a literature review in *Personas – User Focused Design*, Lene Nielsen argues that although personas have become an increasingly common tool over the past two decades, there is "no unilateral understanding of the application of the method" or "definition of what a persona…is" (2013, p. 14). Nielsen creates a taxonomy of approaches to personas: goal-directed personas, role-based personas, fiction-based personas, and engaging personas (2013, p. 14-16); I provide a brief overview of each type below. This categorization shows the different ways personas have been conceptualized over time and contextualizes the engaging persona approach, which I use in this project.

Goal-directed Personas

Cooper imagined goal-directed personas (1999; Cooper, Reimann, & Cronin, 2007) as a valuable tool for addressing a flawed, yet prevailing logic in software design at the time of his first publication: a product would accommodate the largest number of users if it contained a broad number of features and functionalities (1999, p. 124). Instead, he argued that users could not be treated as a single homogeneous group, but rather sub-groups that have discrete goals when they interact with a product. A goal-directed persona description contains a precise description of one member of a sub-group and the member's exigencies or motivations for interacting with a product. Once personas were created, designers could then tailor their products and features to meet these goals.

Role-based Personas

Unlike goal-based personas, role-based personas are descriptions of users with attention to the user's situation within larger organizational contexts. Developed and championed by John Pruitt in various publications (Adlin & Pruitt, 2010; Grudin & Pruitt, 2002; Pruitt & Grudin, 2003), role-based personas go beyond the primary user's goals by including additional information related to the persona's use of the product. This might include insight into the persona's typical daily routine, work responsibilities,

technical competencies, and information about other players who might affect the user's interactions with the product. Pruitt and Grudin argue these expanded descriptions can help designers have a better understanding of a user's realities (2003, p. 5). This approach attempts to capture important environmental information that influences a user's interaction with a product that might not be described in a goal-directed persona.

Fiction-based Personas

Fiction-based personas differ significantly from other types of personas. Crafting goal-based and role-based personas are time-intensive processes that include collecting, accessing, and analyzing data about users and potential users of a product. Fiction-based personas draw on either the designer's intuition and experience (Norman, 2004, para. 8) and are more concerned with helping designers empathize with potential users of their products than providing a realistic or accurate picture of the user (para. 4). Norman describes his "ad-hoc personas" as succinct and agile communication tools (para. 18), often created on the spot during consulting meetings and with a life span of the exercise.

Engaging personas

Nielsen introduces the engaging persona approach in her dissertation (2004) and subsequent book (2013). The engaging personas method seeks to capture a "sense of who [the personas] are" by creating a complex character who enables development teams to understand and engage with the persona's rhetorical situations (p. 66). The creation of a "round character," she argues, allows those who use the persona to "identify with the actions, knowledge, and feelings of the character, …understand the actions of the character, …and context within which the story plays out" (p. 67). This level of insight can provide opportunities for developers to foster an appreciation for the characters that reflect the realities of users. Since it is often more difficult for people to engage and understand those who have significantly different experiences than their own, Nielsen's method calls for particularly complex persona descriptions (p. 67). Drawing from character development theory in scriptwriting, engaging personas include additional descriptors, including physiological (appearance), sociological (social, economic, education, and cultural background) and psychological (needs and motivations) information, that will encourage and enable developers to have deeper understanding and connection with the personas (p. 68-69). Thus, the engaging persona perspective combines and expands aspects of goal-directed personas, role-based personas, and fiction-based personas.

Since personas are used commonly in industry, only a small percentage of use cases are ever documented in scholarly publications. However, Nielsen has documented several applications of the engaging persona approach in her own work as a scholar and a consultant (2002; 2007; Nielsen et al, 2013). In her dissertation, Nielsen partnered with the Danish subsidiary of AstraZeneca to help redesign their website's

Asthma Control Centre. These pages provided visitors with information about managing the condition and allowed users to track their symptoms in an online diary (Nielsen, 2004). After a series of interviews and workshops, Nielsen and the AstraZeneca team developed personas for the primary user groups of the Asthma Control Centre. Ultimately the profiles contained information about each persona's "bodily expression, gender and age; self-perception and character traits; cultural and social relations; goals, ambitions, and frustrations" (p. 155-156). For example, the AstraZeneca team had identified an additional user: medical practitioners. Instead of combining functionality for both doctors and patients on one website, two distinct websites were tailored to the specific needs of each group. As a result of this exercise, AstraZeneca made significant technical and content changes to their website to reflect the motivations and goals of their users (p. 284).

Methods

In order to enact this project, I crafted three engaging personas as models for developers of smartphone period tracking applications. This required an approach in which users are imagined through rich and descriptive profiles that seek to illuminate users' goals, needs, and motivations to create a truly user-centered technology that addresses the unique situation of these users.

My method was based on the model presented by Nielsen (2013) in Personas - User Focused Design. I completed the following steps:

1. Data collection
2. Data coding and interpretation
3. Determining number of personas
4. Crafting personas

Data Collection

Engaging personas describe fictitious, yet plausible, users that are created based on real user data. Thus, the first step in completing this project was to reach out to users who had used period tracking applications in the past, but had felt the technologies available were unable to help them meet their goals.

I designed a survey that collected the following information:

- Demographic information
- Attitude towards menstruation
- Attitude towards period tracking applications or other self-tracking health technologies
- Experience using period tracking applications or other self-tracking health technologies
- Motivation to use, or not use, menstrual tracking applications

Because the survey asked for personal information about participant's experiences with and attitudes about their bodily processes and had the potential to collect other sensitive information about identity and health, I decided to recruit participants online to maintain the interviewees' anonymity. Those who wished to contribute to this research must have met the following criteria:

- Over the age of 18
- Experienced current or previous menstruation
- Attempted to track, record, or measure attributes of their menstruation using a digital tool or smartphone application

I sought out several online communities on the social media site Reddit which matched groups of individuals whom I had previously identified as users of reproductive technology tracking technologies, but whose needs designers may not have considered during development, as identified in the Project Justification section of this report.

I reached out to moderators of two-dozen forums and received approval to post recruitment material and a link to my survey in three communities:

- r/PCOS: a forum of individuals with Polycystic Ovary Syndrome (~9000 subscribers
- r/edno: a forum of individuals with endometriosis(~2100 subscribers)
- r/menopause: a forum for individuals experiencing perimenopause and menopause (~500 subscribers)

The recruitments posts were live for one week, and over this time, I collected 81 responses.

Data Coding

I reviewed the submissions for completeness and discarded 50 partial survey responses. Of the remaining 31 responses, I selected ten of the most complete and detailed surveys to analyze. My goal was to identify trends and similarities among participants. To do this, I compared individual responses across ten areas: demographic information, identity markers, attitude towards menstruation, motivation for tracking, and information recording while using tracking technologies.

This analysis allowed me to identify "clusters" by considering the way interviewees had responded similarly across the areas of consideration. These similar response clusters revealed the needs and goals of particular types of users. Thus, each "cluster" became the basis for a persona and established the qualities of that user group.

Crafting Personas

Each cluster was transformed into a complex and tangible model of a user. While the interview data functioned as an explicit primary source of information about each user group's particular motivations and needs, this data alone was not enough to create a persona. Drawing on Royster and Kirsch's concept of Critical Imagination (2012, Location 950), I also considered the implicit contextual understanding of the user's rhetorical situations. In order to do so, I reviewed the interviews in each cluster holistically, attempting to capture the spirit and intention of the participants in order to craft a profile that reflected the wider context. This was a necessary step for creating round characters which felt realistic and relatable to the designers who would be required to understand and empathize with these personas as models of users.

Personas

Michelle

Michelle is a 49-year-old woman who lives in the Southern US. She has been married to her husband Mike for twenty-five years and they have two sons together, who are both in high school. Michelle received a business degree from a local state university and has worked for many years as a financial planner. She is on track to retire in a few years, after her sons move out to go to college. She is most looking forward to doing some international travel, something she has not yet had a chance to do. Michelle describes herself as open-minded. She is eager to learn and enjoys the challenge of figuring things out.

During her childbearing years, Michelle never found her menstrual cycle to be more than, at worst, a mild inconvenience. Her period came regularly, and she was easily able to estimate her ovulation on her household calendar when she and her husband were trying to conceive. Since entering perimenopause however, Michelle has been frustrated by how difficult it has been to predict her cycle as it becomes more irregular. Further, she has also recently been experiencing migraine headaches for the first time in her life; her doctor suggested that this could be attributed to a change in hormones.

Michelle downloaded a period tracker onto her cell phone in the hopes she might be able to better predict the day she will begin to menstruate and discern a connection between her cycle and migraine headaches. To her dismay, she found that most of the popular apps were focused on fertility. Michelle was unable to input data about some of the new symptoms she was experiencing, including vaginal dryness, fatigue, hot flashes, and difficulty sleeping. There was also nowhere she could indicate the days she experienced headaches or the severity. Michelle eventually stopped using the app and began logging her symptoms in the notes application that was built into her phone's operating system. Although she is now able to record the information that is important to

her, she is annoyed that the data is difficult to read and it is difficult to find patterns in her health information over time. Although she considered building herself an Excel spreadsheet, she decided it would be too inconvenient to track her symptoms on a computer while traveling, so she continues to manage her information in the notes application.

Leila

Leila is in her last year as a biology and computer science double major at a large university in California and is in the process of applying to several graduate programs. Leila's parents were both born in Morocco and immigrated to the Western United States soon after she was born. She remains close to her parents and younger sister, who she texts everyday. She is now twenty-three and lives in a small apartment, which she shares with her boyfriend in the west side of the city where her school is located. After attending class and working in a university lab in an undergraduate research position, Leila feels like she has little time to spend on herself in the evening. A self-proclaimed perfectionist, she spends some of her off time trying to work ahead in her courses but always finds time for an episode of her favorite web-series on Netflix before turning in for the night.

Leila suffered from delayed puberty and did not begin to menstruate until she was sixteen years old. When she began having periods, they were irregular and painful. Leila addressed these concerns to her primary care physician at her next physical. After a blood test and pelvic exam, she was diagnosed with Polycystic Ovary Syndrome. Last year, Leila menstruated only seven times. She finds it difficult to predict her irregular cycles and has often found herself embarrassed as a result of not carrying feminine hygiene products when her period began.

At her last doctor appointment, Leila was unable to recall the date of her last menstrual cycle. Her friend recommended that she download a period tracking app to help her keep track of her historical health data and predict future periods. She used the application that her friend used, and entered her data after her next period. Although the app worked well initially, Leila found that the app's algorithm could not account for her lengthy cycles. Often, the app would assume that Leila had forgotten to enter data for the month that she had not had a period. She was unable to customize the app to include cycles that were almost two calendar months long. The application always predicted her period would come significantly earlier than it actually did, and sent her a notification every day after this predicted date informing her that her period was late. Leila deleted the application in frustration.

Amber

Amber is twenty-eight and lives in a mid-sized city in the Midwest. Amber completed two years at a private arts college a few cities away, but was unable to pay for tuition for her

last two years. Amber moved back to her hometown, where she makes a living selling her art and does freelance graphic design via her own website. She enjoys the flexibility that working from home allows. Amber recently broke up with her long-term girlfriend and keeps her mind off of it by throwing herself into her volunteer work. She puts in several hours each week at the city library and the local animal shelter. Since she has experience promoting her own business and is digital media and marketing savvy, she also is an active member of an LGBTQ advocacy group and helps create content and material for the group's online presence.

Amber has been struggling with menstruation for many years. The pain that accompanies her monthly cycles is hard to endure and she is usually completely incapacitated for the first three days of menstruation. Although Amber discussed the severity of her symptoms with her doctor in her early twenties, she felt as though her doctor dismissed her concerns. When she transitioned from her parent's health insurance to her own, she switched physicians. Her new doctor agreed to perform an ultrasound, which revealed severe endometriosis. She began taking hormonal therapy for the condition, but it has not completely relieved her symptoms.

Amber purchased a period-tracking application through her smartphone app store to help her record the pain associated with her menstrual cycle and the symptom severity. However, she found the app only allowed her to input information for cramps. The app tried to calculate the relationship between cramping and the first day of the menstrual cycle; Amber found the app was not well suited to manage information about her chronic condition. She was also unable to earmark the days where it is especially hard for her to manage her symptoms. Additionally, since her doctor has informed her that it will likely be very difficult for her to conceive and bear children in the future, Amber felt slightly annoyed by the app's fertility alerts and advertising banners for pregnancy tracking apps. Amber eventually discontinued use of the app.

Significance

Developed to support User-Centered Design, personas are a tool for overcoming some of the challenges for creating effective, usable technology. This includes the possibility of misalignment between the developer's perception of users and the user's realities. Without insight into user's motivations and rhetorical situations, designers are able to rely only on their own experiences and their own assumptions about the way that the end product will be used. As discussed earlier, period tracking applications in particular are vulnerable to this misalignment due to the climate of smartphone application development. In this project, personas highlight specific assumptions about users that were built into the period tracking applications. Michelle, a perimenopausal user was unable to track the specific symptoms she was experiencing in relation to the changes in her cycle. Designers who built the app she was using did not include a way for users to track information other than the typical indicators of fertility. Leila, who experienced

cycles that could be two months in length due to infrequent ovulation, found the application could not incorporate the data points she provided into its calculation of her average cycle length. Likely, designers included specific parameters in the application's algorithms that did not consider the possibility of large deviations outside of the "normal" 28-day cycle. Amber, who suffered from regular and painful cramping and used an application to help her remember the days she experienced this symptom, found that her application was ill-suited for recording this information because the application assumed that any symptoms associated with menstruation were cyclical, or only occurred at one point in the cycle. Personas provide designers with insights about ways that their products work among different groups with different motivations – different *how*s and *why*s – and to empathize with their users. With this information, those who create these technologies have options to adjust or redesign existing technologies to be more inclusive and more usable.

Personas, and this project, validate and acknowledge the lives, knowledge, and experiences of those outside of dominant groups (Harding, 1991) and provides the opportunity to include these viewpoints in the "design and direction" (p. 124) of future iterations of health tracking technologies. It created a space and an opportunity for women to share their experiences and their voices. The participants in this research had needs that were not considered when the period tracking smartphone applications they used were designed. It was clear from language provided by the participants in the interviews that using a technology that was not designed to meet their needs was frustrating. This negative experience was likely compounded by their own experiences in dealing with their bodies, experiences which may not be validated elsewhere as well.

Finally, this project was an opportunity to incorporate a humanistic approach to personas and acknowledge the ways that feminist and technical communication theory could contribute to discussions that were developed in other fields and exist primarily in industry. It serves as an exercise and model in bridging practice between industry and academia. Although practitioners and scholars have published discussion of their use and suggested methods, the body of work that discusses personas – their design, development, and effectiveness – is insufficient and contains few models. Further, even in scholarly work, only a small number of explorations of personas explicitly contain exploration of guiding methodologies. In other words, most discussions about personas provide the concrete steps to crafting personas, the practical aspects of collecting and interpreting data, rather than exposing the considerations and commitments of their developers.

Further Research

Throughout this project, I have argued that personas are a valuable user-centered design tool. Although my discussion only considers period tracking applications, researchers should consider the way that personas could be used in the development of

other health-tracking technologies. Other products that are designed to allow individuals to track health concerns must attend to *why* the user is collecting their health data and *how* the user plans to use the information.

Personas created for this project were developed using a small sample size and were recruited from three online communities on a single social media site. There are likely other user groups feel like their needs are not met by available period-tracking applications. The personas in this report specifically attend to the goals and needs of a select population of women who are experiencing medical conditions or changes in their health affected their menstruation. However, this is only a small portion of the users who may not be a part of the narrow user group the technology was designed for: healthy, sexual active, heterosexual, cisgender women. Future research may consider the needs of individuals who are

- Infertile or struggling to conceive
- Of non-normative gender identity
- Experiencing other health concerns that impact menstruation

This project is part of larger efforts that address the concerns of feminists, technical communicators, and user-centered designers in academia and in industry. Further research in this area should use personas and persona development methods to solicit insight from additional populations of users and potential users of these applications, and other technologies like them, to contribute to understandings of how to create better and more usable end products.

Bibliography:

Adlin, T., & Pruitt, J. (2010). *The essential persona lifecycle: Your guide to building and using personas*. Elsevier.

Baek, E. O., Cagiltay, K., Boling, E., & Frick, T. (2008). User-centered design and development. *Handbook of research on educational communications and technology*, (1), 660-668.

Brangier, E. & Bornet, C. (2011). Persona: A method to produce representations focused on consumers' needs. In Karwowski, W., Soares, M. M., & Staton N. A. (Eds.) *Human factors and ergonomics in consumer product design: Methods and techniques* (pp. 37-59).

Cooper, A. (1999). *The inmates are running the asylum: Why High-tech products drive us crazy and how to restore the sanity*. SAMAS. *Indiana, USA*.

Cooper, A., Reimann, R., and Cronin, D., (2007). *About face 3.0: The essentials of interaction design*. New York: Wiley.

Grudin, J., & Pruitt, J. (2002). Personas, participatory design and product development: An infrastructure for engagement. In *Pdc 02 proceedings of the participatory design conference.* Retrieved from http://www.crcnetbase.com/doi/abs/10.1201/b11963-54

Harding, S. G. (1991). *Whose science? whose knowledge?: Thinking from women's lives*. Cornell University Press.

Johnson, R. R. (1998). *User-centered technology: A rhetorical theory for computers and other mundane artifacts*. SUNY Press.

Juon, C., Greiling, D., & Buerkle, C. (2011). *Internet marketing from start to finish: Drive measurable, repeatable online sales with search marketing, usability, crm, and analytics*. Indianapolis, IN: Que Publishing

Kozlowski, L. (2012, March 22). Women in tech: Female developers by the numbers. *Forbes Entrepreneurs*. Retrieved from http://www.forbes.com/sites/lorikozlowski/2012/03/22/women-in-tech-female-developers-by-the-numbers/#3c24e24f2a0a

Lupton, D. (2014). Quantified sex: A critical analysis of sexual and reproductive self-tracking using apps. *Culture, Health, and Society, 17*(4), 440-453.

Min, J. (2015, April 5). Personal Interview.

Nielsen, J. (2006, June 26). Quantitative studies: How many users to test? *Nielsen Norman Group*. Retrieved from https://www.nngroup.com/articles/quantitative-studies-how-many-users/

Nielsen, L. (2004). *Engaging personas and narrative scenarios: A study on how a user-centered approach influenced the perception of the design process in the e-business group at AstraZeneca* (Doctoral dissertation). Retreived from http://personas.dk/wp-content/samlet-udgave-til-load.pdf

Nielsen, L. (2007, November). Personas–communication or process. In *Seventh Danish HCI Research Symposium* (p. 25).

Nielsen, L. (2013). *Personas - user focused design* (Vol. 15). Springer Science & Business Media.

Nielsen, L., Nielsen, K. S., Stage, J., & Billestrup, J. (2013, September). Going global with personas. In *IFIP Conference on Human-Computer Interaction* (pp. 350-357). Springer Berlin Heidelberg. Retrieved from https://www.irit.fr/recherches/ICS/events/conferences/interact2013/papers/8120349.pdf

Nieters, J. E., Ivaturi, S., & Ahmed, I. (2007, April). *Making personas memorable*. Paper presented at the annual Computer-Human Interaction Conference, San Jose, CA. Retrieved from http://dl.acm.org/citation.cfm?id=1240905.

Norman, D. (2004, November 16). *Ad-hoc personas & emphathetic focus*. Retreived from http://www.jnd.org/dn.mss/personas_empath.html.

Paul, A. (2015). *Articulating the menstruating body: An examination of period tracking applications.* Unpublished manuscript, Michigan Technological University.

Pattison, M., Wilson, J.R., Clarke, T. (2007). Wayfinding, accessibility, inclusive design and passenger information systems e 'Euston station and beyond'. In: Wilson, J.R., Norris, B.J., Clarke, T., Mills, A. (Eds.), *People and Rail Systems: Human Factors at the Heart of the Railway*. (25-35). Ashgate Publishing, Abingdon, UK, pp. 25e35.

Pruitt, J., & Adlin, T. (2012). Putting personas to work: Employing user personas to focus product planning, design, and development. In Jacko, J. A. (Ed.) *The human-computer interaction handbook: Fundamentals, evolving technologies, and emerging appliations* (pp. 1055-1080). Retrieved from: http://www.crcnetbase.com/doi/abs/10.1201/b11963-54

Pruitt, J. & Grudin, J. (2003, June). Personas: Practice and theory. In *Proceedings of the 2003 Conference on Designing for User Experiences* (p. 1-15). ACM.

Royster, J. J., & Kirsch, G. E. (2012). *Feminist rhetorical practices: New horizons for rhetoric, composition, and literacy studies*. SIU Press.

Seigel, M. (2013). *The rhetoric of pregnancy*. Chicago: University of Chicago Press.