

Internet Ecologies of New Mothers: Trust, Variety and Strategies for Managing Diverse Information Sources

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Abstract

New parents are faced with the challenge of quickly acquiring a new base of knowledge, while simultaneously navigating a significant life change. While both new mothers and fathers experience new and unique parental demands, their early caregiving challenges differ and new mothers often search for different types of support and information online. We here present findings from an exploratory interview study of how new first-time mothers navigate online resources as they transition into parenthood. We find that many parenting tasks are supported by a variety of resources, which are often used in combination to accomplish a task. We also found that variety in sources was often valued over general source credibility, and new mothers relied on their own ability to filter information to assess how much to trust information. We also provide more general insight into the methods individuals used to gain domain knowledge in a completely new area.

1. Introduction

The transition to parenthood is possibly one of the most significant life changes people experience. During this transition, particularly new mothers, who carry most of the physical burden, seek information and social support from a variety of resources, such as medical professionals, family members, and parenting websites [3], [14]. Being in a unique situation (one could argue that new motherhood only happens once, if ever), new mothers traditionally rely heavily on other women's previous experiences, both for seeking new domain knowledge and connecting with others who share their experiences. Social media propose an opportunity for supporting exactly these issues and a few studies have already addressed issues around new parenthood in relation to social media use, for example in relation to anonymity for new moms in social media [27], and the support of fatherhood on social networks [2]. Considering new parenthood to be a life event, social media sites have long been described as providing social and emotional support for users, such as people with specific interests or ailments [12, 13], as

well as identifying and handling periods of life transition [6], [16], for example transition to university [1], [24], and divorce [28].

Building on research relating to life-changes and previous studies of parenthood, we here focus on new mothers' use of a variety of web resources, such as medical information sites and social media sites (ranging from anonymous to personal). As with other previous research on parenthood [5], [9], [13], [12], [17], [27], we studied mothers because they experience unique physical demands around giving birth, social expectations of being the primary caretaker, and identity pressures around working or staying-at-home. Fathers also experience unique demands, which have been a specific focus in social media research [2], yet this is not the focus of this paper. Our aims were to describe the online resource ecology that new mothers utilize, consider the factors or characteristics determining which sites are used, and discuss how new mothers navigate often unreliable online content for important information.

To learn more about how web resources are integrated to support everyday parenting needs and tasks, we interviewed 12 pregnant and new mothers about their personal Internet usage, in regard to parenting. We considered usage of anonymous social media sites, such as baby forums, and non-anonymous resources, such as Facebook and other digital tools for communicating with people one already knows. We also asked about non-social parenting resources such as medical webpages, and non-medical parenting webpages. We found that a diverse ecology of web resources supported a wide range of activities from fact finding to getting social support and that mothers were using a mix of websites to accomplish their tasks.

In this paper we provide three contributions:

- We present results from interviews with 12 first-time mothers, exploring their processes for searching and finding pregnancy and parenting-related information. Specifically we found that the questions asked by new mothers were often complex in nature, simultaneously representing multiple goals. For example, the search "infant sleep tips" is simultaneously a search for sleep strategies, as well as

a way to find other mothers experiencing similar struggles.

- We provide a wider view of how web resources are used in combination to accomplish tasks. Specifically we found that mothers rarely used only a single resource to accomplish a task.
- We provide findings relating the role of trustworthiness to the utility of a resource. Specifically we found that general trust of a particular resource was often not related to the perceived usefulness of the resource.

2. Related Work

2.1. Information Foraging

We recruited only first time mothers for our study, because we wanted to have a window into how people collect data on a previously unfamiliar topic. Similar research has been conducted on how individuals find information on the web, a process that has been referred to as “information foraging” [21]. This concept was adapted by Pirolli and Card [20] from ecology’s optimal foraging theory that models how animal balance the search for food with energy expenditure to a model to understand human information search behavior on the web. This adaptation has proved useful for describing web usage patterns and has informed topics such as socially supported search tasks and domain specific searching [4]. We implement concepts and terms from this theory by considering how new mothers engage in a long term, self-motivated, information gathering task. While previous research has focused mainly on the search for factual information, we broaden the space by including the search for social support.

2.2. Social Technologies for Connection

Our work builds upon existing research exploring new parents’ interactions with technology and, more generally, exploring the nature of finding information on the web.

Gibson and Hansen for example reported on how technology can help mothers retain their identities, escape social isolation, and build confidence. The mothers in their study were able to assert their position as ‘more than just a mother’ through their use of the technologies [11]. This research also highlighted the role that smartphones played in supporting tasks, since the mothers often encountered situations in which traditional computer use would have been awkward (e.g., while lying in bed during a late night feeding). The mobility and ubiquity of mobile phones also impacted usage, with 88% of the mothers reporting that

they used their phones for tracking naps, changes, and feedings. While these might earlier have been tracked on paper, phones provide a convenient and readily available medium for tracking and monitoring these patterns. This is consistent with statistics reported by Neilson, which indicated that mothers, relative to other women and the general population, were more likely to use mobile phones to access social data [18].

Morris also studied the role of social networks during the transition to motherhood [17]. Morris surveyed 412 new mothers and collected data for 233 mothers who posted on the popular social networks Facebook and Twitter. Through this tracked data Morris was able to categorize types of content that mothers posted about their children on social networking sites. Our study takes a broader look at social media and other web-resources, including forums, informational sites, and blogs, that support the needs of new parents. These resources are important to consider because in addition to representing a broader range of information, they are also more likely to be engaged with anonymously. This is in contrast to traditional social media, where the performative aspects can impact engagement [7]. Other studies have also addressed sharing of information between new mothers, through online resources [9], [12], [27].

2.3. Automated analysis

De Choudhury, Counts, and Horvitz explored how mining social data might enable us to identify significant life events such as childbirth. Their work explored how aggregated data can be used to train models, which can then be applied as filters to future data streams [6]. They extended this work on identifying periods of life transitions by analyzing sentiment to predict changes in mood and behavior. This kind of analysis could be useful for providing the right resources at the right times, especially for new mothers, suffering from postpartum depression [5].

Schoenebeck also explored data at scale, looking at 5.3 million anonymous interactions on the parenting forum YouBeMom.com. Her findings indicate that anonymous sites provide parents with space to discuss topics that might be socially unacceptable in other settings [27].

2.4. Choosing who to trust

Gathering information and seeking social support in relation to such personal issues, trust of the resources become very important. In our study we explored how new mothers put different levels of trust in different resources, something other researchers have also addressed. Fogg et al. presented results from a 2,684-person study of what elements people used to

evaluate the credibility of websites on a range of topics [10]. The most influential aspects identified for perceived credibility were the design and look of the page (46%), the information structure (28%), and the information focus (25%). While these aspects certainly play a role in perceived trustworthiness, in our study we were also interested in how aspects not available in a lab setting might affect credibility, such as friends' recommendations, or referrals from already-trusted websites.

While Fogg et al.'s study regarded a range of web resources, there has also been research looking specifically at how parents navigate pediatric webpages. Benhardt and Felter [3] reported on how mothers use the internet to search for pediatric medical data. Through focus groups with 20 young mothers they found a range of health-related searches. Mothers reported using a variety of methods to find medical sites, including word of mouth, doctor recommendations, and search engines. The most popular information sites were commercial ones, such as BabyCenter.com and ParentsPlace.com, which participants referred to as convenient and comprehensive. Our study extends on this idea, looking at how new parents use a collection of web resources to accomplish knowledge acquisition tasks, especially for topics where there is often not a single correct answer, such as sleep habits and toilet training methods, and how they seek social support. Additionally, we explore assumptions regarding the necessity of trust in the acceptance of new information.

2.5. Bringing resources together

Plantin and Daneback looked at a range of parenting studies and found that due to reduced access to local support, parents feel increasing pressure to rely on internet resources for support and information [22]. Additionally, even when support is available, Rzeszotarski et al. found that individuals were often hesitant to ask too many questions of their social networks. These results suggest that even when trusted individuals exist, the perceived social costs may encourage users to self-serve information online [23]. The results of this study suggest that people feel there is a limit to the acceptable number of questions that can be asked in short spans of time. We posit that broadening the range of used resources may help new mothers spread out their searches and avoid "spamming" their personal networks.

While previous studies have looked in depth at particular slices of the web (e.g., social networks [1], [6], [9], [14], [17], parents of special needs children [27], medically focused fact finding [1] or fathers' use of social media for parenting [2]), the goal of our study is to explore the search habits of new mothers across a

variety of resource types. We posit that many tasks' requirements do not fit within the confines of a particular resource, leading mothers to combine information from a collection of sources. Our work builds upon and extends the existing literature on digital motherhood by looking at how the complex ecology of web resources are employed to support the social and informational needs of new mothers.

3. Method

To obtain insights into new mothers' practices for seeking and attaching personal value to specific resources, we conducted an initial exploratory study using semi-structured interviews.

While parenting is a complex task that often incorporates the efforts of both fathers and mothers, we acknowledge that there is still a strong cultural bias as to how parenting roles are distributed in the US, where this research was conducted. While also acknowledging that fathers are increasingly involved in child caretaking, we decided to focus on mothers, because they are significantly more represented at online parenting resources and because we wished to reduce interference caused by differences in gender and culturally expected parenting roles.

3.1. Participants

For recruitment, we combined snowball sampling (approaching friends of friends) with distributing flyers in family-friendly locations (e.g., a yoga studio that offered mommy-baby yoga, a "kids café", and other cafes in residential areas populated with families). We recruited 12 participants, five who responded to flyers and seven who we approached directly. All lived on the West Coast in the United States.

We recruited women that were at least seven months pregnant or had given birth to their first baby within the previous year and a half. We decided to include pregnant women because our informal inquiry and personal experience indicated that a lot of search and social bonding in relation to new motherhood starts already during pregnancy. In our sample, two were pregnant and ten had babies with a median age of four months. The women were middle class. Ten were married, one lived with her partner, and one was no longer involved with the father of her child. All mothers still in relationships were in relationships with another man. While recent studies have suggested diminishing class difference in web behaviors, our sample is not representative of the broader population [8].

For the interviews, we were interested in participants who were transitioning to parenting their first child, including only women in the third trimester

of pregnancy up through having a baby (or twins) 12 months in age. In total, 12 interviews were conducted with new mothers (3 with twins², and 9 with singletons). In this paper we refer to the mothers by pseudonyms to maintain their anonymity.

3.2. Analysis

We interviewed ten participants in person and two, who were unavailable for in-person meetings, by telephone. The interviews lasted 45-60 minutes and were conducted by any one of the authors. The interviews were audio recorded, transcribed, and analyzed using qualitative methods. We asked questions pertaining to participants' use of online forums, informational websites as well as any other online resources they used in relation to themselves as new mothers and their babies. To gain perspective of their social support outside the internet, we also asked into their family setup, how far they lived away from supportive family and relatives as well as who they would approach for support 'in real life'.

The interviews were analyzed using qualitative categorization and coding, techniques rooted in social science [15]. Specifically, we used iterative coding where the raw interview data is first examined in relation to the original themes of the interview; then new categories are derived to better explore the data. Our secondary categories were: resource identification, motivation for each type, anonymity vs. known identity, social support vs. information search, and issues of trust. We then extracted more detailed categories, and compared and contrasted the participants' statements to each other, in order to find accumulative and valid categories. Finally, we wrote up the subset of themes that we address in this paper. The analysis was done collaboratively between all three authors.

4. Parenting Resources

The new mothers in our study reported using a wide range of Internet resources to get information about their children and build networks to support their new roles as mothers. We list the different types of resources that the participants reported using and the number of participants that used each. It was common for participants to use two or three of the listed resources on a regular basis.

- Q&A forums (e.g., BabyCenter, The Bump, Mothering.com, alumni group, hospital based group, specialized mailing list)
- Social Network subgroup (e.g., Facebook)
- Medical web resources (e.g., KellyMom, The Mayo Clinic, WebMD, What to Expect)
- Product Oriented sites (e.g., Amazon reviews, YouTube reviews, other review websites)

Many of the new mothers reported using Google.com as their basic search tool, at least for initial exploration of an issue. They would then filter the results by looking at the website to determine if it was credible or not. At this stage, participants had formed opinions about specific websites in terms of them providing professional information vs. user-generated information.

Question and answer forums were particularly valued for finding information from people with relevant experience, especially for mothers with specific needs, such as those having twins or having trouble with breastfeeding. However, the interviewees were acutely aware that Internet forums, where fellow mothers submit questions and answers, provide a very different kind of information than professionally-produced websites, such as the medical websites WebMD and the Mayo Clinic's site. Some of the most relied-upon question and answer forums were the ones that combined an already existing "real life" network (e.g., a local hospital's maternity group or an alumni association) with an online forum.

Mothers reported using Facebook for a range of parenting-related tasks, from sharing moments in their own lives, to finding others who were experiencing similar things. Mothers often employed Facebook when they desired to interact with people with whom they felt a sense of connection, which is in line with more general uses of Facebook. Medical parenting websites were mostly used for searching for specific information about medical issues, such as illness related to both mother and child (e.g. jaundice or mastitis). These sites were generally trusted sources of information. Finally, Amazon and other product review sites were considered convenient sources of information for researching for facts about baby gear and equipment, such as strollers and feeding supplies.

A nuanced trust model was developed and employed by new mothers, and we explore this topic in the discussion.

² The relatively high rate of twin mothers was coincidental, and probably mostly an artifact of the fairly small sample size. Two of the twin sets were identical, and one set was fraternal.

5. Results

5.1. Motivational Characteristics

Our interviews shed light on how new mothers use different web resources for different reasons and purposes. We particularly highlight five motivational characteristics for using specific resources. We describe each in detail, in relation to the most used resource for the purpose: finding “like” others, finding an online home community, receiving information with emotional support, being anonymous or being known, not imposing on others. We then discuss the methods mothers implemented to find and evaluate web resources to support their needs.

5.1.1. Finding “Like” Others. One of the main motivations for the pregnant women and new mothers to access resources was to find others with similar experiences. Many were far from their own mothers due to work, school, or marriage, and few had close friends who were at the same life stage. For these women, the Internet provided ways to find and communicate with mothers experiencing the same stage of pregnancy or those with a similar aged baby. But, as with most life events, mothers acknowledged that each person approaches parenthood differently and with different circumstances; this meant that people could reach out to strangers who, for example, also had scheduled cesarean sections, who breastfed, or who had a premature baby. Interestingly, but not surprisingly, the mothers who experienced more unusual challenges, such as having twins, reported a greater dependency on web resources. This was often a two-fold issue because a unique situation can often make meeting in person more difficult, and it can be harder to use friends and family as resources if they have never experienced the same challenges. Elyse explains:

“I think there [...] are people there who have multiples and are struggling with breastfeeding problems and they are two months ahead of me and that was awesome. They were like 'well actually at four months they started breastfeeding on their own without any problems'. Whereas they had a lot of problems. So it is not too late. Because a lot of the stuff says well, if they don't breastfeed from birth then it is all over. And that is completely not true. [...] Particularly having the internet in this case is very useful because I don't know anyone who has the answer. Because you need to be online to get answers in relation to [...] twins.- Elyse

This participant used web resources extensively, especially for finding twin-specific information. Others, such as Corinne, would mix local meetings with a hospital-based (closed) web forum; this group was specifically for parents of twins. On the forum she

would answer questions, particularly those about juggling work and having twins, and she also attended the group's regular evening meetings.

[A]t the last [hospital] meeting Monday, they asked me to be a big sister (they call it that), for parents that need help, then I would be the one that would be answering for them and be there for them. [...]

Interviewer: Can you think of an answer [you provided]?

Corinne: I answered [...] a lot of questions about managing, about how to work and have kids. A lot about how to find a babysitter, find a nanny and what questions to ask in an interview.

Participants were proficient in finding resources employed by like-minded people, not only in terms of interests and background but also parenting philosophy. Cindy, for example, was an active participant in a church-affiliated group where they had a “Christian curriculum for new moms”. Mothers expressed confidence in being able to find like-minded individuals online, saying:

These self-found groups of “like” others served as communities where participants could ask questions and find support when they felt overwhelmed, as described in the following section.

5.1.2 Finding an Online Home Community. For many of the mothers finding a home community was a central part of their online parenting tasks. In these communities mothers could ask questions and give and get support from people in similar circumstances.

“In the twins group, like if other people went through this or had this kind of problem and how it ended up being resolved when I didn't see the end of anything in sight. The fact that I didn't have enough milk, I wanted to know how common that was for twin moms, and it was kind of reassuring to know that other people had gone through the same thing because the clinic wouldn't tell me that. Sixty percent of our moms have this problem or here, let me direct you to this other person who's had the same issue; a clinic couldn't offer that.” -Elyse

In some cases a community formed in one online location, but the needs of the group shifted, leading it to relocate to a location better suited to the goals of the group. Hannah was part of such a group. Initially the openness of an online forum helped her find a group of mothers who had babies the same age as hers. However, once these mothers had found one another, they desired the privacy and intimacy of a more limited access space to discuss their parenting struggles with one another, so they moved to a (closed) Facebook group. After the mothers had found a supportive community they felt comfortable asking many types of

questions, and they relied on this community more than on other resources.

5.1.3 Receiving information with emotional support.

Another core motivation for participants to use different resources was to receive both information and support. Being in an unfamiliar situation with possibly many different opinions expressed regarding one's caretaking behavior can lead to insecurity. New mothers may seek answers to factual questions (such as, "should I feed my baby every hour or every second hour?") and emotional support confirming that what she is doing is okay. Many of the web searches engaged in by new mothers combined fact finding with a search for social support, to assuage fears of not being a good enough mother, or to validate feeling annoyed or upset about difficult situation like sleepless nights.

"When I would read the forums it would sometimes give me peace of mind, but sometimes also, just the feeling that you are not alone" –Joanna

Cindy expressed the emotional support in terms of getting through a hard time:

"It's just like someone being in your shoes. I think that's a huge thing because it is such a change as a mom, like your life... like things are so different. Like, "Okay, not every day is... happy, and some days are hard, harder than others." It's just kind of knowing that, that things will pass, they will sleep again. You will get through it" –Cindy

This particular motivation of mixing information seeking with emotional support was very common among the new mothers we interviewed; the participants were able to seek out and find resources that would provide them with that, such as themed online forums and email lists.

5.1.4. Being Anonymous or Being Known. The participants used both anonymous and non-anonymous online tools in order to get information and support from different sources. Friends, family, and other personal acquaintances are valuable resources, given their familiarity with one's current context, history, preferences, and personality. However, in complement, anonymous forums and online mothers' groups provided important outlets for questions that participants were not comfortable asking their friends and family. One strong motivation for remaining anonymous was to be able to ask sensitive questions.

One participant, Erica, particularly divided her questions sharply between a university-specific forum for alumni (with subcategories for parents) and the more anonymous online forums, such as mothering.com. She explains the division in terms of questions:

"[At the university alumni board] I ask concrete questions like what slings, which diapers... On mothering.com I am more interested in --- breastfeeding is the one I look at the most. During my pregnancy it was mostly medical things, issues I was having during pregnancy. But at the [university alumni board] I can't hide behind my anonymity so I didn't ask medical questions there." - Erica

Having an outlet to ask questions anonymously allowed mothers to find answers to questions they may have avoided asking in person to avoid embarrassment. However as with many domains online, anonymity was also viewed as a two-edged sword. Several people felt that forum contributors could easily attack other mothers for doing/thinking something 'wrong' and simply hide behind a username. Most participants expressed that, through their observation, parenting is an aspect of life that people often have very strong beliefs about; this was a factor in their decision to adhere to specifically-themed resources (eg. attachment parenting, Christian parenting, scheduled parenting). Others, such as Laura, gave up on anonymous forums specifically because of what the anonymity let people express:

"I have tried to avoid internet forums in general. I think they're not—I go to Baby Center because I think it's reputable and the weekly emails are interesting but I tried hard not to look at any of their user-generated stuff [...].I used to look at user-generated content on the internet and I never left feeling happier or calm or anything but freaked out"–Laura

And Hannah left public forums to go to Facebook for a more 'intimate' level of communication with some accountability:

"I just feel like the people would just be rude on [the public forum], [...] you know, you have your user name and that's it, [...] so you could like ask a question and people would just tear you apart and be so rude, and so I started backing off from it because I was scared to ask a question. So other people were feeling the same way and they created the Facebook group to be more intimate". -Hanna

One participant, Joanna who was 8 months pregnant did not feel that the resources were providing for a high enough level of anonymity:

"Sometimes the user features, sometimes they want so much data from you. I just wish they would let you post more discretely or anonymously, then... I might have been more active, some of these sites it was a bit complicated to pose questions." –Joanna

This brings us to another drawback of using anonymous parenting resources – the lack of context and understanding among the participants. Although participants acknowledged that friends on Facebook often had limited medical knowledge, their deep

personal knowledge was often equally valuable, particularly for parenthood.

5.1.5. Not Imposing on Others. In our interviews, mothers shared when they felt it was appropriate to “impose” on others by asking a question, and when they choose to avoid asking, relying instead on online research. This finding parallels Rzeszotarski et al.’s findings on self-censoring of questions due to the perceived social costs of friend-sourcing [27]. Much of the time, participants reported turning to web resources when they felt a topic was not significant enough to warrant asking.

“I recently had to buy a baby bottle brush with a bottle nipple cleaner attached to it. My God, there’s so many choices. You have no idea how many different kinds of bottle brushes there are in different configurations. I know they’re all cheap but it was just a sort of ridiculous overflow of choice. I may have spent an hour on Amazon trying to figure out which \$3.50 item I was going to buy. I’d ask them [mailing list] for information, but probably not for something as pointless as a baby bottle cleaner, but I would for trying to get a new baby carrier. I asked for advice from the women on there. Simple stuff I probably—little things I might just sort of obsessively look at Amazon.” – Laura

Perceived availability was another way that our participants reported balancing when to impose on friends and when to seek support and answers online.

“It’s just advice, or kind of like commiseration. The thing with the internet, if you are having a bad night, you can go on there at 2:00 am and someone else is probably on there.” –Cindy

The core characteristic of the life change of new motherhood is the major context change of the mother’s life: the new baby is ever present, physically and mentally. The new mothers tried to divide requests to friends and family for help and advice, to preserve these relationships.

These five issues were the main motivational characteristics for using the diverse set of online resources. We now continue discussing how new mothers mapped their needs to the capabilities of online resources, with emphasis on their strategies for managing diverse varieties of sources, particularly focusing on trust and variety.

5.2. Trust Not Indication of Utility

Many of the pregnant women and new mothers expressed trust in professional medical websites, but reported little trust in other online sources. However, although the mothers approached the information they found online with skepticism, they still reported finding value in the information.

The mothers expressed a general skepticism regarding the information they found in forums and, to a lesser degree, user-generated material such as mommy blogs. Perhaps surprisingly, knowing the people who were sources of information did not make the sources more trustworthy, possibly because our participants recognized the knowledge limitations of those people they knew closely. We posit that this element of skepticism may actually allow for quantities of un-vetted data to be useful. Mothers came to their own conclusions drawn from many sources, rather than simply accepting a single solution. The mothers spoke of “sifting” and “filtering” the information they found online to decide what they would trust and what they would ignore.

“On forums you do have to read the comments but take everything with a grain of salt.” – Elyse

Some, like Laura, used particular signals to filter information, while others went on gut feeling.

“There’s a kind of particular rhetorical construction that I think is easy to fall into which makes fearful parenting and every time I read it on the Internet, I just stop, cold turkey, kill the page, move on and it is ‘You would never forgive yourself if...’, that is a sign that the person writing that comment is a crazed alarmist” – Laura

The challenge here was to not only find the ‘right’ information but also ignore the discouraging information or opinions that did not align with the parenting philosophy of the mother. In this relation the trust level does not exist on a sliding scale according to type of resource; instead there is a more detailed sense of judging each post. In essence the participants became very proficient in detecting “crazed alarmists” who were only spreading fear.

5.3. Seeking Variety

For many of the questions they had, mothers did not seek a single answer, but instead they were interested in discovering a range of possibilities. In these searches, finding a collection of answers was more important than finding a single answer from a more credible source. This reflects the nature of the questions; parenting is not only about medical issues or questions that have one correct answer. Instead parenting requires a continuous interpretation of children’s behaviors and expressions to be able to discern their needs. Daily tasks, such as napping and feeding, are practiced differently by different parents, and most variations have few serious consequences. Thus, seeking a range of opinions was a common task among the mothers.

Joanna provided a helpful illustration of how she searches for new information using a variety of sources to inform her final decision:

“So if I want to find out about a stroller, then I go to YouTube a lot, because they have a lot of instructional videos and reviews [...] Once I find a narrow range of selection of strollers, then I go to a product page, but that is once I have narrowed it down. Reviews on YouTube can be a year or two old, they might not have that model then I will go [the manufacturer ...] and Amazon for my product reviews.” -Joanna

The task in this example is representative of many in parenting in that it lacks an objective “best” answer. Instead, a collection of resource types is consulted, from user-generated results to corporate pages. Information seekers synthesize information from these sources to decide whether a particular item is the right fit for their situations.

Despite the lack of objective “best” answers, mothers still reported feeling pressure to make personal “best” decisions regarding their babies. In our interviews we saw this sentiment repeated by many participants. From Laura’s smaller purchase of a \$3.50 bottle brush, to Johanna’s larger purchase of a stroller, new mothers wanted to make optimal choices in respect to their children regardless of the magnitude of the purchase. Participants also integrated information gathered in face-to-face interactions with that collected online.

“I think [online and face-to-face] supplement each other. It is not one or the other, it is a combination of both. If I get the same information from both sides then I am more likely to trust it.” -Silvia

The accompanying challenge with pursuing a range of opinions is deciding what sources are most useful in this. We found that mothers were not simply separating websites into categories of useful or not, but rather adapting their decisions dynamically depending on the nature of the information they sought. For example, our participants named web forums as a questionable place for medical information, but forums were mostly a good resource for finding social support and reading about the experiences of other mothers in regards to issues they themselves were experiencing (e.g., sleep loss, breast feeding pain, colic). The participants described it as the difference between getting “the right answer” and getting a list of experiences.

Erica, who had 5-month-old twin girls, described her strategy for finding parenting information online and provided insights into the numerous debatable issues of parenting:

“When I look for information on the internet I will often look at the clinical websites first. [...] The Mayo clinic will often give you the right answer, but the special thing with babies, and especially with things such as breastfeeding, you are not looking for the right answer, you are looking for various suggestions. [...]

Sometimes it is just that you want to know that it is possible; you want someone to say, “You know I had this problem and it got better”. [...] It is nice to have someone who has struggled with [breastfeeding] and who thinks it is as important as I do, go “Yeah, it did, eventually it just worked”. - Erica

While participants found that a site did not necessarily represent their single view or situation, they used their own ability to synthesize data and felt confident in their ability to apply their own contextual information (e.g. temperament of their baby, past experience) to choose which information to accept and which to ignore.

6. Implications for Design

After looking into the strategies and practices of new mother’s information and community seeking, we present three design implications:

White- and Blacklists. Some participant had given up on particular types of categories or sources in order to refrain from seeing content incompatible with their views or information needs. For example, Laura stayed away from anonymous forums due to some bad experiences: *“I pretty quickly realized that the rules are pretty simple and that looking at anything that pregnant women would tell each other was, again, pointless and anxiety inducing. [...] When I was pregnant I decided that I should just stop. Full stop. If I had a question, I asked my midwife before I went to [the online forums]”*. Another similar strategy was to stick to a set of well-known sources such as particular forums and medical sites. Most participants made use of this strategy, but some were more structured about it than others. Although a common method initially was to do a google search, the sources that came up were still sorted by the participants according to the particular need and level of trust. Erica, for example, had early on found a Facebook group for twin mothers and felt that this was enough in terms of reassuring her of her twin’s thriving and provide her with emotional support: *“I got into this [...] group by a [friend] and I think it’s from that. I’ve never actually sought out these forums”*. Helping users customize which web sources they are served for certain searches (e.g., user generated, physician generated) could help reduce the complexity of these everyday search tasks.

Value in a broad range of sources. Our data showed that participants sought a range of sources, e.g. social networks, reviews, and product pages, which suggests that supporting users in finding a wide variety of data is valued. These strategies for managing the variety of data illustrate the participants’ competencies for information search and meeting communication needs (social support and exchange of related experiences). This is counter to some existing search

algorithm implementations that tailor searches based on previous behavior [25], which can create filter bubbles [19], limiting the range of viewpoints that can be accessed.

Support rather than Solutions. While there were times where these mothers were searching for an optimal answer, there were also times where they were more curious about the range of experience. In these cases mothers often searched forums, read blogs and asked friends to gain access to a wider perspective. This type of search is often not well supported by search algorithms that assume a “right” answer, and taking into account this type of search behavior has the potential to better serve a wider audience.

7. Limitations

In this study we use new motherhood as a lens for understanding how individuals might navigate long-term information seeking around a new subject area. Although we attempted to reach out to a wide set of potential participants, the study included mostly middle-class ‘older’ mothers who presumably have a wider set of resources (economic, social and medical) when compared with other socio-economic groups. We are therefore not able to generalize through a wide set of new mothers but have to limit our results to this particular group. Still, we found that this group, being fairly tech-savvy, were able to provide valuable insights into use of Internet resources relevant to a large group of new mothers and the challenges they face are, in many cases, not unique to their specific situations. In particular, the task of finding information regarding questions for which no single answer exist, is relevant to many subjects (e.g. teaching methods, home decorating, saving money).

8. Conclusion

We set out to explore how new mothers navigate and vet the abundance of online resources they have at their fingertips. This ecology of resources supports a range of parenting tasks, and the knowledge and support-seeking tasks engaged in by study participants often spanned a range of resources. New mothers’ information management strategies suggest that future work should consider the flow among web resources, and not be limited to individual websites. We also present evidence that while trust is valued, new mothers were resilient to low-quality information, overcoming the poor quality by collecting a broad range of information and constructing their own conclusions by sorting out irrelevant or fear-inducing information. Our findings regarding trust, anonymity, and social costs contribute to the overall understanding

of how to better support users whose searches are more complex than just seeking the “right” answer. Finally, the broad range of available resources enabled mothers to take advantage of contextual information, facilitating the finding and building of communities where they felt comfortable asking questions of people they knew, and also enabling them to engage anonymously when needed for sensitive issues. We found that access to a diversity of resources was highly valued by the mothers in our study, allowing them to use several strategies for finding appropriate information for their particular need and situation, while being able to disregard irrelevant and unwanted content. These strategies helped them find a range of perspectives to support them in their roles as mothers—a task that while common is entirely unique to each individual and family.

9. References

- [1] Ammari, T., Kumar, P., Lampe, C. and Schoenebeck, S., 2015, April. Managing children's online identities: How parents decide what to disclose about their children online. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems* (pp. 1895-1904). ACM.
- [2] Ammari, T. and Schoenebeck, S., 2015, April. Understanding and Supporting Fathers and Fatherhood on Social Media Sites. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems* (pp. 1905-1914). ACM.
- [3] Bernhardt, J., J.M., and Felter, E.M. Online Pediatric Information Seeking Among Mothers of Young Children: Results From a Qualitative Study Using Focus Groups. *Journal of Medical Internet Research* (2004) 6,1.
- [4] E. Chi and P. Pirolli. Social information foraging and collaborative search. HCIC Workshop; 2006 February; Fraser CO.
- [5] De Choudhury, M., Counts, S., and Horvitz, E. (2013). Predicting Postpartum Changes in Emotion and Behavior via Social Media. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. CHI 2013.
- [6] De Choudhury, M., Counts, S., and Horvitz, E. (2013). Major Life Changes and Behavioral Markers in Social Media: Case of Childbirth. In *Proceedings of Conference on Computer Supported Cooperative Work*. CSCW 2013.
- [7] DiMiccio, J.M., Millen, D.R., Identity management: multiple presentations of self in

- facebook. In Proc. of Conference on Computer Supported Cooperative Work. CSCW 2007.
- [8] Dunham, P.J., Hurshman, A., Litwin, E., Gusella, J., Ellsworth, C. and Dodd, P. 1998. Computer-Mediated Social Support: Single Young Mothers as a Model System. *American Journal of Community Psychology*, 26 (2), pp. 281-306. Springer.
- [9] Drentea, P. and Moren-Cross, J. L. Social Capital and Social Support on the Web: The Case of an Internet Mother Site. *Sociology of Health & Illness*. Blackwell Publishing, pp. 920-943. 2005.
- [10] Fogg, B. J., Soohoo, C., Danielson, D R., Marable, L., Stanford, J., and Tauber, E.R., 2003. How do users evaluate the credibility of Web sites?: a study with over 2,500 participants. In Proc. of Designing for user experiences 2003 (DUX '03). ACM Press. pp. 1-15
- [11] Gibson, L. and Hanson, V. L. 2013. Digital motherhood: how does technology help new mothers?. In *Proceedings of CHI 2013*. ACM Press, pp. 313-322.
- [12] Hui, M., Ly, C., and Neustaedter, C. 2012. MammiBelli: sharing baby activity levels between expectant mothers and their intimate social groups. In CHI '12 Extended Abstracts on Human Factors in Computing Systems. ACM Press. pp. 1649-1654.
- [13] Jackson, A. P. 1998. The Role of Social Support in Parenting for Low-Income, Single, Black Mothers. *Social Service Review*, 72 (3), pp. 365-378.
- [14] Johnson, S.A., 2015. 'Intimate mothering publics': comparing face-to-face support groups and Internet use for women seeking information and advice in the transition to first-time motherhood. *Culture, health & sexuality*, 17(2), pp.237-251.
- [15] Lofland, J., Snow, D. A., Anderson, L. and Lofland, L. H. *Analyzing Social Settings: A Guide to Qualitative Observation and Analysis*. Cengage Learning. 4th edition, 2005.
- [16] Mo, P.K.H. and Coulson, N.S. Exploring the communication of social support within virtual communities: A content analysis of messages posted to an online HIV/AIDS support group. *CyberPsychology & Behavior* 11. 2008. p. 371-374.
- [17] Morris, M. Social Networking Site Use by Mothers of Young Children. In *Proceedings of Conference on Computer Supported Cooperative Work*. CSCW 2014
- [18] Nielsen NewsWire. Infographic: The Digital Lives of American Moms. May, 11, 2012.
- [19] Pariser, E. *The Filter Bubble: What the Internet is Hiding from You*, The Penguin Group, 2011.
- [20] Pirolli, P., Card, S. K. "Information foraging in information access environments." In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. CHI 1995.
- [21] Pirolli, P. 2009. An elementary social information foraging model. In *Proceedings of CHI 2009*. ACM Press, pp. 605-614.
- [22] Plantin, L., Daneback, K. 2009. Parenthood, information and support on the internet. A literature review of research on parents and professionals online. *BMC Family Practice* 10(1):34.
- [23] Rzeszutarski, J.M., Morris, M.R. Estimating the Social Costs of Friendsourcing. In proc. SIGCHI Conference on Human Factors in Computing Systems. CHI 2014. ACM Press. pp. 2735-2744
- [24] Smith, M.E., Nguyen, D.T., Lai, C., Leshed, G., Baumer, E.P.S., Going to college and staying connected: communication between college freshmen and their parents. In Proc. of Conference on Computer Supported Cooperative Work. CSCW 2012
- [25] Teevan, J., Dumais, S.T., Horvitz, E. Personalizing search via automated analysis of interests and activities. In Proc. SIGIR conference on Research and development in information retrieval. SIGIR 2005.
- [26] Warren, P. L. 2005. First-Time Mothers: Social Support and Confidence in Infant Care. *Journal of Advanced Nursing*, 50 (4), pp. 479-488. Blackwell.
- [27] Schoenebeck, S.Y. The Secret Life of Online Moms: Anonymity and Disinhibition on YouBeMom.com. In Proc. Of the AAAI International Conference on Weblogs and Social Media. ICWSM 2013.
- [28] Yarosh, S. and Abowd, G.D. Enriching Virtual Visitation in Divorced Families. In *Connecting Families: The Impact of New Communication Technologies on Domestic Life*. Springer, 2012.