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'Digital Motherhood': How Does Technology Support New Mothers?

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ABSTRACT

New mothers can experience social exclusion, particularly during the early weeks when infants are solely dependent on their mothers. We used ethnographic methods to investigate whether technology plays a role in supporting new mothers. Our research identified two core themes: (1) the need to improve confidence as a mother; and (2) the need to be more than 'just' a mother. We reflect on these findings both in terms of those interested in designing applications and services for motherhood and also the wider CHI community.

Author Keywords

Motherhood; new mothers; social support; ethnography

ACM Classification Keywords

H.1.1 [**Models and Principles**]: User/Machine Systems – *human factors*. H.4.3 [**Information systems applications**]: Communications applications; K.4.2 [**Computing Milieux**]: Computers and Society

General Terms

Human Factors, Design

INTRODUCTION

With approximately 131.4 million births every year worldwide (4.3 million in the US and 780 thousand in the UK) new mothers represent a significant number of individuals [9]. For these new mothers, the change in lifestyle and the recovery period forces a physical isolation that can cause social isolation. This exclusion is particularly prevalent in the first few weeks, but may extend throughout the first year and sometimes beyond.

Becoming a parent can be one of the most stressful experiences in a person's life [16]. Mothers in particular are faced with physical tiredness (associated with recovery from the birth, lack of sleep and the constant demands associated with motherhood) and mental tiredness (associated with uncertainty and constant learning) [2]. These issues can contribute to parenting stress, relationship strain and in some cases to postnatal depression. Further difficulties are encountered if the infant or mother experiences health complications following the birth. In this situation, the mother can experience distress and a sense of disempowerment through the loss of the maternal role and prolonged physical separation from her infant [10].

Access to social support and interactions for new parents has been linked to better maternal health, relationship satisfaction, child development outcomes, and parent-child interactions [19]. It also increases parent confidence and reduces emotional and physical stress [2]. Research suggests that new mothers often seek support most from other new mothers with similar backgrounds [2]. Attendance at antenatal (prenatal) classes (a common precursor to birth but not mandatory) is one place where friendships and the corresponding social support can develop [25]. For those who do not attend an antenatal class, or find that they have nothing in common with those they meet at classes, the weeks following childbirth can be particularly isolating.

However, even those with a wide social network can find the first few weeks isolating. The reasons for this are varied. For example, recent research shows that despite the availability of online networks (such as *Netmums* in the UK [22]) and more immediate support in the family and community, many mothers feel socially isolated, especially those aged between 35 and 44 [27]. Demographic changes over the last 20 years have shown more and more women having children later in life. Often, these older mothers have established careers prior to giving birth and, consequently, much of their social contact takes place within the work setting. Other factors that can lead to isolation for new mothers include changes in society, such as geographic mobility and family separation that have affected the social support available through family and friends.

The potential for technology to provide interaction, information and support is immense. Through the use of technology, new mums could retain social connections and forge new (relevant) connections for their new status (motherhood) in life.

The power of social connectedness and interactions for new mums is profound [19]. Not only does it significantly impact their maternal wellbeing, but also that of the child, particularly better parent-child interactions leading to children who are confident and secure exploring their world and surroundings. While social connectedness has real benefits for the mother, child and the surrounding family, social isolation can have profoundly negative consequences. The changes in hormones and the overwhelming responsibility felt for another can put new mums at risk from postnatal depression. While many mums will experience the 'baby blues' (a common but short-lived state during the perinatal period), approximately 1 in 10 mums in the UK will experience postnatal depression during the first year [20]. Furthermore, many of those experiencing postnatal depression find it difficult to get support or admit they need it [8]. Maternal postnatal depression has been linked to short and long-term negative effects for the child's behaviour, emotional and social wellbeing [e.g. 1, 12].

Technologies such as social networking sites, tablet PCs and smart phones have the potential to provide new mothers with ad hoc social interaction and support. This research set out to identify where technology and motherhood meet and how technology might be used to support new mothers. This research had the goal of understanding the intersection between motherhood and technology and providing a stimulus to others within the CHI community to design to support the needs of new mothers.

RELATED WORK

Within the Human-Computer Interaction (HCI) community, there has been some research interest in issues surrounding motherhood [such as 13, 28] including a Motherhood and HCI workshop planned for CHI 2013.

Other fields (such as nursing, midwifery, child health, social and cultural geography) have also researched the relationship between motherhood and technology. There is a body of work looking at the online information seeking behaviour of parents, with specific work relevant for new mothers such as searching for information relating to pregnancy and childbirth [15] and relating to their newborn child [5].

Considering mothers as a whole, it is reported that the Internet serves the needs of mothers better than any other form of media, particularly in relation to relaxation with 48% saying that their time online is often the most peaceful part of their day [3]. The survey fails to drill down for a reason but perhaps it is most relaxing because going online coincides with an infant nap and an opportunity to sit down. Nevertheless, the Internet does provide a variety of benefits for mothers: it is convenient, always available, there are a range of audiences and no appointment is necessary in order to seek advice [17]. It can also provide support for groups whose access is restricted, such as mothers living in geographically remote areas [17]. There is, however,

disagreement within the literature over the importance of support and information provided from the Internet with some reporting it as the most important source support and information [17] while others report it has nominal importance [27].

In response to social isolation in new mothers and the increased use of the Internet to provide informational and emotional support, a variety of online resources aimed at pregnancy and parenthood have emerged. Much is made about the potential of online services such as social networking sites in providing social connectedness and social support, with studies looking at specific web sites which offer features that allow social support to be exchanged online [26, 17].

Evidence suggests that use of these sites contributed to a high general *perception* of support (our emphasis) [26], a greater sense of empowerment [27] and seemed to rival the support traditionally found in neighbour communities [4].

Blogging has also been investigated within the context of motherhood, finding that blogging is a reasonably popular phenomenon among new mothers [18, 14]. In their study of 157 mothers McDaniel et al. found 61% authored their own blog. They suggested that frequency of blogging positively predicted feelings of connection to extended family and friends.

Recently, the smart phone was identified as the device that 'helps mums get through the day' [3]. It is seen as a lifeline with which you can communicate, share, find information and take a break. It is reported that in the US 54% of mothers own a smartphone [24] which is similar to the UK which reports over 50% of mothers own a smart phone [3]. Related research also shows that mothers are more active in their use of smart phones for social networking (50%) than the general population (37%) or females overall (39%) [23]. While these statistics look at mothers as a whole population, new mothers are generally younger and potentially more tech savvy so it is not inappropriate to suggest that these numbers may be larger for new mothers.

In the current research, we ask the question "How does technology affect new mums' experience of motherhood?" Ethnography allowed us to capture a cultural snapshot on tech-savvy mums approach to early motherhood.

METHODOLOGY

Experimental context

A critical ethnographic approach was used for the study. The work was based within a small geographical area of the UK. Given the proximity to a large university, the population sampled would be characterized as relatively affluent and well educated.

Contact with new mothers was facilitated by the researcher being a relatively new mother herself, thus making it easier to gain acceptance and access to the cultural knowledge within this specific community. Research participants were

recruited solely from five parent and child groups. They were community based groups so attendance varied from regular attenders to those who came and tried it but did not return. One group attracted a lot of ad hoc attendance through the advertisement of a 'special guest' each month (for example, a health visitor[1], a paediatric nurse talking about meningitis, a psychologist talking about play and infants development) who could complete a short talk. It is sometimes difficult to attend a new group so the researcher did not approach newcomers with a consent form on their first visit. However, there were five occasions where the participants (someone new to the group) shared stories relevant to the research that the researcher approached the participant at the end and asked if they would be willing to consent to the researcher noting their story. All consented. Only two out of the five attended the groups subsequently having expressed an indifference or time constraint to attending the groups again.

A rapport developed between the participants and the researcher based on the shared experience of pregnancy, childbirth and motherhood. This helped build a relaxed and informal atmosphere. The relationship built between the researcher and the mothers was transparent; the researcher explained she was interested in their experiences of motherhood and anywhere technology featured and hoped learning about their experiences would exercise her 'baby' brain. From the participants' point of view, any interest the researcher showed in discussions was made palatable by their empathy about still using her brain (many of them were also engaged in activities to 'use their brain' such as open university courses, foreign language learning or new hobbies). The researcher was constantly aware of her dual role (both as a researcher and also as a member of the community being studied). As a researcher, every attempt was made to try to remain neutral, but the emotive nature of the subject and the personal interest in it causes the researcher to admit that full neutrality was difficult. In response, the voice of the participants (using extensive quotes) strongly features in the results section [6].

Unusually, in this research the researcher attended each group with her child. On the positive side this was (1) a practical option as the research took place while the researcher was on maternity leave, (2) it added a sense of authenticity to the research interest, (3) facilitated a connection to the group, and (4) provided focal points for discussion to help establish good relationships. On the negative side, the children could be distracting and when the children provided an interruption that required the adults' attention the information being shared was suddenly stopped, providing an overview of the facts but without the richness of the previous storytelling.

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[1] A health visitor is an NHS nurse who makes regular visits to check on the health of new mothers and their babies.

Various methodological workarounds seemed to help ensure good data was being gathered. These were attending during feeds or nap time (particularly easy in the early months) and nappy (diaper) breaks in the bathroom provided opportunities for interim notes to be taken. Finally, the research came to a natural end both when there was a period where no new data was gathered but also when the increased mobility of the researcher's child precluded quality data gathering.

Participants
The study was conducted from 2011 to 2012 over a period of 8 months. Permission was granted for the study by the School of Computing Ethics Committee; the mothers participated through Informed Consent. The study was in two parts: firstly a series of ethnographic observations and secondly a small group of ethnographic interviews.

Ethnographic observations [N=42; M=29.3 years old; SD=3.6 years] took place in five parent and child groups in Central Scotland. All mothers had been working up until the arrival of their infant apart from two mothers who were made redundant shortly before they found out they were pregnant. The purpose of the groups was to provide a place for parents to bring their babies to meet new people and find support. Two of the groups were based in a rural community, two groups were based in a small city and one group was based in a suburb of the city. The groups were based in moderate to high socio-economic areas. All women had an infant under 1 year old [N=43; M=23.8 weeks; SD=9 weeks]. It should be emphasized that the discussions of technology always emerged from the participants and the primary researcher did not lead the discussions in anyway. As such there were many observation sessions where technology never came up.

The observations and conversations were complemented by six in-depth personal interviews with new mothers [N=6; M=30.5 years old; SD=4 years] who had a baby within the last 12 months. Informal efforts were made to recruit participants that would represent the diversity of the population, based on education (2 university education, 2 college education and 2 high school education), work status (3 planning to return to work, 1 not planning to return, 1 unsure whether to return and 1 currently unemployed), and geographical area (3 from the city and 3 from rural town near the city). The efforts were informal as they required the participant to agree to participate, find a mutually suitable time and not have to cancel due to infant or maternal illness. Interviews were rearranged multiple times with two original participants requiring to be replaced.

Each interview lasted approximately one hour. We presented the findings (concepts) from the preliminary analysis (see below) and asked the participants to discuss and elaborate whether this is something they have experienced. The aim of the interviews was to explore and contextualize the primary findings. The interviews took the form of informal conversations and were conducted in

neutral locations such as local coffee shop. Infants were present during interviews.

Data analysis

The ethnographical data consisted of observations of in-situ group conversations and individual conversations while looking after or playing with the infants. Data recording relied on written field notes made immediately after each group meeting. Data was anonymised by assigning each mother with an unique ID starting with *Mum A* (using a different letter in the alphabet for each participant and then double letters after 26 participants) up until *Mum PP*.

The ethnographical data was analyzed by using the constant comparison technique of the Grounded Theory approach for qualitative analysis [11]. The data was read and open-coded to produce an initial code list, which was re-worked until the analysis reached theoretical saturation with respect to the amount of information. At the same time, relationships were established between the categories identified in the open coding through axial coding. The data was then selectively coded in terms of core and subcategories from the initial and axial list. Preliminary data was analyzed at 4 months to gain a better picture of what had been gathered and to identify emerging issues on which to focus.

Full analysis (as described above) was repeated on all the data collected after 8 months of observations/conversations and in-depth person interviews.

FINDINGS

There were two core categories that emerged from the analysis, which will be used to tell the story of new mothers and technology:

- Improving confidence as a mother: seeking advice; breaking into the 'new' community; technology for parenting.

- More than 'just' a mother: identity preservation; connecting to the world outside their bubble.

Improving confidence as a mother

Seeking advice

Mothers in this study used the Internet to source information on parenting, developmental stages, feeding and health concerns.

I might go as far as saying my search engine is my best friend. I certainly use it as my first port of call when I have a niggle, concern or question. Maybe I use Google too readily and should start listening to my instinct but well, to be honest, I like the confirmation or reassurance it provides. [Mum FF]

It is perhaps unsurprising that the mothers reported using the Internet as a tool to find information to answer their questions and concerns. There is an abundance of web sites available presenting information relevant for motherhood. While there was no mention of checking the credibility of the information they found, many of the mothers did

highlight the appropriateness for them to check multiple sources in order to determine a consensus. So in a sense they were doing an informal consistency check.

I check a few web sites, just to make sure that everyone is saying more or less the same thing. Once or twice the first page I looked at was alarming (worst case scenario type thing) but the rest of the sites helped balance this out a bit more. [Mum X]

Many of the mothers reported that they felt many of their questions in the early days could be perceived as 'silly' and searching the Internet provided them with a less embarrassing place to ask 'silly' questions.

I google for answers all the time – particularly when I think I should know the answer. I don't really want the health visitor or my sister or even my new friends to think I am a bad mum because I don't know the answer to simple things. [Mum F]

The potential for the Internet to provide a safe place to ask embarrassing questions is a powerful form of support (if used with the proper judgment on the credibility of the information sourced) for new mothers. We can therefore extend the similar finding by Madge and O'Connor [17] (on one specific web site) to include the Internet in a wider context.

Web sites with forum features such as *Netmums* in the UK [22] were specifically discussed as they ranked highly in most of the search results. Mothers reported that they often could find the answer to their question without having to ask the question themselves. This is specific to web sites whose discussions are open and therefore the output from forum discussions become part of collective knowledge available. Consequently, they get their answer instantly and deal with it straight away.

As I say to my husband all the time "If in doubt, google it". I have yet to ask Google something it can't help me with which is brilliant. I deal with the problem before I could even get the health visitor on the phone. [Mum L]

I have picked up loads of tips on forums just by having a wee nosy about. I don't like to write anything – probably because I haven't got anything to contribute but I like to have a nosy. [Mum CC]

Other mothers reported that when they looked for advice on situations they were struggling with such as reflux or sleep deprivation, it was reassuring to find that others were in similar situations.

I battled with Amy's reflux – she was such an unhappy and unsettled baby we rarely left the house until she was about 5 months old. One day I searched the web for more information on reflux (beyond what the doctors had told me) I came into a discussion on reflux on a web site and was thrilled (oops did I just say that – sounds mean doesn't it) to find others were having a horrible time too. [Mum C]

At first when I went out and about, I saw nothing but mums who had got it all together and were 'natural' mothers. Thank goodness, I read comments on one of the baby web sites about someone who felt terrible that she still felt overwhelmed one month in. And then when I saw all the responses she had from people feeling the same way, I felt so relieved. I wasn't alone, I wasn't a crap mother, I was just normal. [Mum F]

Madge and O'Connor also found that new mothers gained reassurance and strength from realizing that others had the same hurdles to overcome [17] and Brady & Guerin found the power of shared experiences in contributing to feelings of normalcy [4]. Access to the Internet and consequently a variety of web services provides the opportunity for new mothers gain strength from these shared experiences.

While forums were popular, many mothers complained that forums were only truly usable on a PC or laptop. As will be discussed later in this paper, smart phones provided mothers with quick and easy access to the Internet. Mothers in this study reported the frustration and difficulties encountered trying to use forums on a smart phone.

Social networking sites, in particular Facebook, seem to fill a gap for online help (possibly made easier by the standard installation of the Facebook app on most smart phones). While data is not currently available for UK use, recent evidence for the US suggests 72% of American mothers use Facebook [24] with 50% actively participating in social media access platforms via mobile devices [23].

The web chat forums are fab but they are too finicky to work using my iPhone. I don't have time to switch the laptop on and look for answers. And, you know, I tend to want to get help at 3 o'clock in the morning so I use my phone as it is there beside my bed. So I use Facebook, you have to wait for people to respond, rather than view what has gone before but even with that it is still way easier. [Mum LL]

Mothers from this study used Facebook to ask questions and receive responses from their online social circle. They found this very easy to do as it was integrated into a medium they already used, and accessed frequently. In addition, unlike some of the web sites they tried to access using their smart phones, Facebook did not require additional log on credentials. Previous research has shown that social networking sites were not significant sources of advice and support for parents [27]. Our participants perceived a benefit of using Facebook and suggested that it was for support and advice but this could be a side effect of an increased sense of empowerment experienced by the mother using Facebook [27].

Breaking into the 'new' community

There is a perception with the mothers in this study that the (non-commercial) social and supportive groups suitable for parents and babies are a hidden community. They reported that it was both difficult to discover and to access the parent community.

When I first had James I had an idea that there was this secret world out there where local mums met up for cake and coffee but I had no idea how to find where AND how to get invited. I began to think that things would only improve when he went to school. It wasn't nice thinking about 5 long years with no real mummy pals. [Mum A]

I had the support of one other mum, we palled about together, but even then we felt we were missing out and not in the loop. [Mum A]

The mothers all knew the importance of 'getting out and about' both for maternal health and perspective but also in order to meet other parents to share their experience with. However, they all stressed how difficult it was when they had not been invited to join a group.

It is not what you know it is who you know! Another mum (who I met at the doctors) pointed me in the direction of my local baby group. I went along and never looked back [Mum BB]

The key problem emphasized by almost every mother in this study was how difficult it was to find community groups they could attend. For mothers who had previously been in employment and used the Internet extensively, they were frustrated that a basic Internet search failed to provide any results for community groups meeting within their local area. Most of the mother and baby groups that were advertised were structured classes than were run as businesses. It is not surprising that commercial baby groups would advertise online to potentially increase revenue. However, while these groups are great, as these classes require a more substantial payment they have a fixed structure and tend to provide less opportunity for developing social connections or provide social support. Community groups tend to be unstructured and as such provide plenty of opportunity to develop friendships with other mothers. Due to the nature of many community groups, particularly those organized and run by volunteers (who are also busy looking after young children), is that often the skills, time and understanding are not available to seek out ways to advertise online.

I never knew about the local baby groups until my eldest was 3 and went to the local playgroup. It was then that I got to know mums from the village and found out about all the activities close to home. Up until that point we travel to the local city to attend activities that were advertised online through Netmums and never met anyone from my area. [Mum J]

In some places, information is provided (in leaflet form) from health visitors who visit new mothers shortly after they come home with their infant but it is often unclear which groups welcome babies, for example groups with the word toddler in the name. This was a source of frustration

with the mothers interviewed as it is most crucial to establish a social network of mums when they are babies.

Once membership with these groups had been established many mothers pointed out that internal groups formed such as Facebook groups or text/email groups (where a single message was sent out to all on the text or email list) to facilitate additional 'meet ups'.

A bunch of us local mummies made a private group on Facebook for chatting, sharing and planning get togethers. It is much easier to use that than texting out to mums because everyone can see the responses. [Mum EE]

Parenting by technology

There were a few examples where new mothers had taken conventional technology and used it for their own unique purpose. While research suggests blogging is not an unusual practice for a mother [18], one particular mother used blogging as a buffer to the external interest and sometimes intrusion she encountered.

I made a blog for my son and it will sound odd to say this but it was for a bit of self-preservation. I have 3 siblings and so does my husband, add in the grandparents, one set of great grandparents, the odd auntie and close friends – we had to field a lot of calls. Plus we were the first out of the family and our social circle to have kids so I guess there was a bit of novelty too. Before he was born, because I was 2 weeks overdue, we were inundated with calls (every day). Don't get me wrong it was great that they cared but so much of our time was spent telling the same thing to each person. I made a blog which we updated regularly (daily at first) with what he weighed, if he had been out and about etc. I think it worked people tended to call less but when they did they seemed to know how things were going and were happy. [Mum X]

Other more conventional blogging strategies are discussed later, for example for self-expression.

Other mothers used technology in a specific and unique fashion. For example, one mother used an online Google document to note timings of feeds, naps and nappy changes while she was learning to understand her infant and develop a schedule. While another used Twitter for the same purpose and her husband made a software application that aggregated the tweets into a summary of the day.

Interestingly these mothers were using their smart phone (specifically apps on their phones) to do these activities. In our study, mothers with smart phones accounted for 88% of participants. This is much higher than the national average, which shows just over 50% of mothers owning a smart phone [3]. Only 12% in our study mentioned having downloaded an app designed specifically for parents despite the plethora available. Perhaps this is because discovery of these apps was largely driven by helpful family members, in particular the father and not the mother herself.

I used a small notebook at first to track feeds, nappy changes and naps. It helped me get to know my son and work out what he needed when. My husband downloaded an app to my phone which did all this for me. Rather than writing, I can press buttons for each activity. It is quick and easy and it even suggests why he might be crying. I don't use it as much as I did but it really helped us get in sync. [Mum H]

My husband put an app on my phone to track feeding. You know just the basic how long (using a timer) and from what side but it was really pretty rubbish. I loved the idea but it had to stay open to work and I wanted to go check Facebook or read the news. If I did that it didn't save that feed. [Mum EE]

More than 'just' a mother

Identity Preservation

Many of the mothers spoke about ways in which their identities changed following the arrival of their child (and tied up with leaving the workplace irrespective of whether this was a temporary or permanent move). Certainly, they were aware that during the peri-natal period the world did seem to revolve around the child and their role as the mother of that child. There was a strong feeling and need by most mothers that they needed to preserve their identity as a person in their own right.

There was a number of ways that mothers used to preserve their own identity. Firstly, using social networking sites such as Facebook provided them with a place to post and share *their* thoughts (emphasis on their as it was stressed that they wanted to share based on what made them unique such as interests they had or a quirky sense of humour and NOT a baby diary with daily photos of the infant). This purpose is very different from the baby storytelling in other studies [14].

I love posting snippets to Facebook and then checking later for likes and comments. I particularly like exchanging banter with some of my close friends. It's a bit of a giggle. [Mum K]

Another form of identity preservation discussed was blogging, in particular for self-expression or as a form of therapy. Only 3 (7%) mothers in our sample reported blogging: one mentioned earlier used it to buffer external attention; and the other two used it to share some of their experiences of their journey into motherhood. This is vastly different from other studies which found 61% of mothers in their sample [18].

My blog is more or less my journey with baby brain. I seem to keep forgetting things or getting myself into a pickle and rather than worry about it, I thought I would write it down and have a good laugh at myself. [Mum Y]

In our study, while the topic was motherhood, these blogs were still all about attempts to preserve their identity

because they were mainly focused on their journey and not about the child.

I have a blog – feels a bit naughty but it is so therapeutic for me. I studied English at University so I would call it a 'stream of consciousness' but basically I just empty my head every evening of all my thoughts, worries and feelings. I have no idea if anyone reads it and to be fair I don't really care. I write under a different name so no one I know would know it was me. But I leave it public for the sole purpose that it might help some poor mum out there who is feeling just as daunted and overwhelmed by me half the time. [Mum AA]

When blogging came up in conversation, many of the mothers found the basic concept difficult to understand and why their fellow mothers would blog. However, hearing the examples from other mothers they could better see the purpose but still were not convinced that it would be something that they would spend their time on.

Connecting to the world outside their bubble
All mothers reported that in the early days there was a disconnection from what they termed as 'the outside world' or 'the world outside my bubble'. This covered contact with their social circle, awareness of current affairs and knowledge of day and date. The mothers who had been in employment prior to having a child reported one of the biggest adjustments (after having a whole new person to care for) was the change in their social circle. Specifically, that they did not appreciate how much of their social network consisted of people they worked with or other people who worked. They found this particularly problematic as it made it much harder to communicate with their social network particularly at times when they most needed it, for example when they were home alone during the day they did not want to disturb someone while they were at work.

When I worked my pet peeve was people who would email instead of picking up the phone [for social communication]. It wasn't until I was at home with my daughter did I truly understand both the potential of email and probably why some people use it so much. With email I can send it at 3am in the morning where a phone call wouldn't cut it. I can also start and stop an email (because I am distracted by a crying child etc) in a way that stopping and starting a telephone call would be irritating. It is nice to be able to email work friends from time to time to maintain some form of contact. I also email friends trying to arrange coffee etc. [Mum S]

Often, this feeling of disconnection from their existing social network can lead to feelings of isolation, particularly where people in their immediate social network do not have children. Technologies that allowed asynchronous communication such as Facebook and to a lesser extent email were thought to be a benefit for maintaining some social contact with their existing social network.

I liked Facebook before but what I realized as a mum is how fab it is. I can get in touch with someone when I am free. And they can read or respond to it when they are free. It never occurred to me until I became a mummy how huge that would be. [Mum P]

In addition, just the passive use of social networking sites allowed them to browse what others were doing and consequently they reported that they felt less lonely knowing they had some grown up contact (even though this was completely passive). This is not dissimilar to the benefits from 'lurking' on forums [4].

[About Facebook] I didn't have to actually make an effort to message people if I didn't feel up to it but I could log in and see that other people were still living their lives. [Mum C]

The desire for social interactions by new mothers can be particularly potent. For example, it can encourage technology adoption where there has been previous strong resistance.

I felt funny about joining Facebook before I had my son. I wasn't really sure of the point of it and I wasn't keen to share too much stuff with lots of people. In fact I took many opportunities to declare what a nonsense I thought it was. But other mums were using it to arrange meeting up so I thought I should join and not miss out. I certainly have my finger on the pulse more now knowing what things I can go to. [Mum Z]

The use of social networking sites such as Facebook seemed to be a popular way to maintain some form of awareness of the world outside their front door.

I just wanted to know that there was other things happening out there (in the real world, outside the bubble I was living in). I wanted something in my life that was for me and was more than just being a mother. Facebook was great for this – I didn't have to actually make an effort to message people if I didn't feel up to it but I could log in and see that other people were still living their lives. [Mum C]

Beyond contact with their social network, mothers felt a strong need for exoteric awareness and to be able to connect to the world around them. One common example was the need to know about current affairs.

I wanted to feel I could contribute to an adult conversation, if I ever got the chance and have just two minutes not being a mummy. I wanted to say to my husband "isn't is terrible what happened in X?". Although I can't even think of an example to give you here. I just wanted to say hey I know what is happening in the world at the moment. [Mum S]

Overwhelming, mothers cited their ownership of mobile phones, specifically smart phones, as one of the best tools for a modern mother. Smart phones provided them with instant access to the Internet, email, social networking and much more. The power of smart phones to provide social

inclusion to mothers was apparent very early in the data gathering. In fact, many of the new mothers interviewed talked about their smart phones as 'life-lines' not too dissimilar to previous findings [3]. Rather than a tool typically used for communication, connection and some entertainment, they were using it to increase their emotional and maternal wellbeing.

Michael needed a wee feed boost about 5am every morning so I would use that time to play with my phone. I loved later in the morning when my husband woke up that I could tell him news items that he didn't already know about. I felt a bit smug if I am honest in the 'look at me my fingers on the pulse' sort of way. [Mum F]

The potential to connect to the world in the middle of the night by using a smart phone was felt to be a life-line for many of the mothers.

My phone is great. I set the screen to be dim so that when I have those middle of the night feeds I can check the news and have a crafty wee game of Sudoku. Somehow that makes being up in the middle of the night feel less traumatic [Mum F]

I can't believe how much I enjoy the night feeds knowing I have something to do other than sit quietly in the dark and try not fall asleep holding the baby. [Mum O]

It also allowed them to gain some control over activities they were responsible for and feel more productive.

I confess to shopping online at midnight either food shopping or an order to Amazon for birthdays that were coming up. I would do it while I would do Hazel's dream feed and I had such a sense of satisfaction at knowing I had been a productive person. [Mum P]

Many suggested that they would not have utilized these online services as much if they had to go to their desktop computer or laptop and wait for it to load up. Interestingly, a small amount of mothers reported the ownership of a tablet PC (sometimes bought as a present or a treat around the time of childbirth) but the feeling was that they were not a useful as they hope they would be.

I got a iPad as a present just before the birth of my daughter. I was used to having online access for most of the day through my job so I thought this would be the perfect solution once the baby was here. What I hadn't appreciated was as a mum I would have to learn to do everything one handed as I would be cradling her, feeding her, entertaining her etc. The iPad doesn't really work for that but my 2 year old HTC is brilliant. I can hold it in one hand easily and can use my thumb to load apps and scroll etc. [Mum Y]

Smart phones also provided new mothers with access to apps undiscovered before the arrival of their infant, such as apps to promote inclusion for the parent who is out at work.

I managed to put something called What'sApp on my phone and it means I can send free picture messages to my husband when he is out at work. That way he doesn't miss out on some of the funny things that happen to Maree. [Mum F]

DISCUSSION

It has been suggested that technology which supports social inclusion could have real impact on new mothers [19]. Due to their age, new mothers tend not to have problems with access to the technology. However, circumstances (specifically their infant) provide restrictions to that access. Mobile devices offer an opportunity for new mothers to regain access without relocating to a PC and offer the potential for access while caring for their child. They offer particular opportunities during the middle of the night, potentially providing new mothers an activity to help them stay awake while feeding or an opportunity to unwind after settling a fractious infant.

This research set out to understand whether technology affects new mothers, and, if so, how it affects them. In doing so, we identified two key themes: improving confidence as a mother and being more than 'just' a mother. Mostly the findings centred around the access to and provision of support, typically informational, emotional and companionship. This is hardly surprising. However, it is the role of technology in reclaiming their identity and their place/connection within the world that was more surprising.

These two themes provide designers some direction on ways to support new mothers. By considering the motivations of the user group, rather than the process of motherhood (pregnancy, childbirth, postnatal care of the infant), there is a potential for engaging this community. The themes speak to the role of the technology in the lives of users – themes that have the potential to motivate other socially excluded groups of people.

Previous work has suggested a lack of research focused on how parents use the Internet on the whole during their journey into parenthood [7]. The present research makes some steps in this direction by looking at where technology and motherhood intersect. This research focuses on motherhood not to discount the impact that parenthood has on the father, but mainly because within current UK society mothers are still largely the primary carer and consequently they were the demographic available at the groups we attended. To our knowledge the level of detail obtained from the present ethnographic work has not been previously reported.

The themes identified in this study are not dissimilar to the findings in other studies [25, 2]. What is novel in this study is the identification of where technology features within these themes. While other studies have looked at technology and motherhood they have concentrated on the use of one specific web site [17, 26, 4] or a specific type of activity such as Blogging [18, 14]. This study attempted to

build a wider overview of where technology and motherhood intersect.

The data does need to be viewed within the context it was gathered. Specifically, the sample was predominately white women with good education levels living within the UK. No attempts are made to determine whether the results will generalize to other populations, particularly as some cultures experience motherhood in different ways, for example the prevalence of alloparenting[2] in come cultures.

Understanding the use of technologies by mothers and indeed, the experiences they encounter could help and enhance development for future mothers and influence health professional's approach and support provision. The documented benefits of social inclusion for new mothers suggests that better and appropriate technologies for new mothers can provide real impact.

There are also commercial implications to understanding this demographic as demonstrated by Mothercare [21] (a large commercial group who sell mother and baby products both online and in store) who adopted a unique marketing campaign during the first half of 2012. Using Facebook they posted a discount offer for a popular product only available for a few hours in the early hours of the morning thus tapping into a captive audience but also making those up at that time feel valued.

Mothercare does this thing where offer specific products at reduced rate (advertised via Facebook) where the advert goes out at say 2am and the offer ends at 7am. I love that they do this – it is a great nod to those mums suffering by being up in the night but also makes you feel part of a secret and special group. [Mum BB]

This has been a smart move by Mothercare who seemed to experience a lot of good will from the participants in our study who had seen these offers. With the economic downturn, they have made a strategic move to be viewed as a company that truly cares about mothers by understanding that they are often up during the night.

CONCLUSION

Motherhood is constantly reconstructed in response to changes in society [17] and on some levels motherhood today is vastly different from previous generations. The availability and pervasiveness of technology today has the potential to further reconstruct a person's approach to motherhood.

We note the relevance of the current findings to many current topics in HCI research. For example, there are immediate implications for digital engagement. Many of the mums reported they found technology to be a powerful ally.

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[2] Form of parenting where members of extended family or individuals from the community take an active role on a day-to-day basis.

This was manifested by technology supports that allowed them to increase their confidence in mothering through seeking information and reassurance on their choices or concerns, that allowed them to assert their position as 'more than a mother,' and that allowed them to take part in some self-directed therapy either through blogging or social networking sites. In addition, we uncovered motivations for technology use where there was previous resistance. Specifically, some new mums reported connections motivated them to use Facebook, which previously they had resisted.

We also note the relevance of the current findings for digital identity research. Technology played a key part in helping mums maintain both a sense of their (old) self as well as forge out a new identity.

Our findings also provide new evidence about social networking sites as community builders. The new mums in our study were kept up-to-date, had a means of contacting other mums, and could invite others to do something together. Furthermore, community groups could use Facebook as a communication tool where a traditional web presence was impossible (due to lack of skills or funding).

Future work is needed to more fully understand the role of technology in the emotional and physical wellbeing of new mothers. The present work, however, paves the way for understanding key roles of such support.

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