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'It Just Gives Me a Bit of Peace of Mind': Australian Women's Use of Digital Media for Pregnancy and Early Motherhood

Deborah Lupton 

News & Media Research Centre, Faculty of Arts & Design, University of Canberra, Bruce 2601, Australia; deborah.lupton@canberra.edu.au

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Abstract: A diverse range of digital devices and software are available to women to seek and share information and personal experiences about pregnancy and parenting. This article reports findings from a focus group study involving Australian women who were pregnant or had very young children. The participants were asked to recount their experiences of using digital media for pregnancy and parenting and what media they would like to see developed that were not yet available. The findings revealed that digital media were very important to the participants. They were using mobile apps, social media, content-sharing platforms and online discussion forums to connect with each other and with family members, post images and other information about their pregnancy and children, track their pregnancy or their children's behaviours and development, and learn about pregnancy, infants and childcare. Despite their frequent use of and reliance on digital media, few participants had begun to consider the implications of sharing personal information about themselves or their children online or by using apps to record details. The implications of these findings are discussed in relation to the complexities of the intersections between information, emotional support, intimacy, personal data generation, sharing and privacy as they are conducted and experienced on the digital media used by women during these life stages.

Keywords: digital media; social media; apps; personal data; motherhood; pregnancy

1. Introduction

Women in the global North who become pregnant and enter the realm of motherhood are confronted with high expectations concerning how they should comport themselves to conform to the ideal of the 'good mother'. Contemporary concepts of the unborn, infants and young children portray them as precious and vulnerable, requiring vigilant protection from the women who gestate and give birth to them. Women are expected to place their children's needs above their own and to engage in rigorous self-care practices while pregnant. Once their children are born, they are encouraged to devote a great deal of care and attention to them to ensure their happiness, health, optimal development and wellbeing [1–5]. At the same time, they are often isolated from traditional support structures and sometimes struggle with coping, particularly in the early months of motherhood [6–8].

Since the advent of the internet and personal computing, digital media have provided important sources of advice and support for many women. Previous research in western countries has demonstrated that women have found blogs, online discussion forums and websites that offer information and allow users to share their experiences with each other to be helpful and reassuring, alleviating some of the isolation, uncertainty and heightened sense of responsibility that many feel during pregnancy and early motherhood (a comprehensive review of this research is provided by Lupton and colleagues [9]). Since the turn of this century, there is now an additional array of digital resources available to women to easily find and share information and advice about pregnancy and

parenting. Women can use mobile devices like smartphones and tablet computers to readily connect to the internet at any time of the day or night and in most locations. Hundreds of smartphone apps are available to provide advice and information about pregnancy and parenting. Studies have found that pregnant women and mothers in the global North are beginning to use apps in significant numbers [10–13]. Many of these provide functions that encourage women to monitor and survey their own bodies and those of their children, thereby entering very personal details.

Social media are now also used frequently by women for parenting purposes. Women communicate with other women on specialised Facebook pages and groups, sharing experiences of pregnancy and motherhood. They typically take a multitude of digital photographs and videos of their children from birth onwards, some of which may be shared with the world on social media sites. Facebook is now commonly used to share details of pregnancy and children with friends and family, while women may use YouTube and Instagram to broadcast images of such events as foetal ultrasounds, the birth of a child and the child's subsequent 'firsts' (first steps, first words and so on) [14–18].

When they are creating and sharing digital information about their foetuses and young children, parents are establishing a digital profile or digital legacy on behalf of their children [19,20]. These images and information have sentimental and private value for parents and (possibly later) their children. However, the value of this information extends well beyond the private domain of the family and close social networks. Once women begin using online media to conduct searches for pregnancy-related products or information, or discuss their pregnancy on social media sites or join customer loyalty programs for expectant mothers, they are very quickly identified as prime targets for marketing pregnancy-related goods and services. Such women are typically consuming many new goods and services related to their children, and thus have been described as the most lucrative demographic group for marketers [21,22]. These details are also often open to data security and privacy breaches. Health, medical and fitness apps in general are notorious for leaking personal data and failing to encrypt data effectively [23,24]. One study found that only one in three pregnancy and parenting apps has implemented a security mechanism to guarantee privacy and confidentiality of the data that people were uploading [25].

Only small number of studies published thus far have sought to identify parents' views and practices concerning the commercial use and data security and privacy of their own personal data and those of their children. They have suggested that women are only just beginning to consider the implications for their children of creating digital profiles about them on social media and using apps [14,16,18,26].

In this article, I report the findings of a qualitative study involving focus groups with women living in Sydney talking about their use of digital media for pregnancy and parenting. The discussion here presented contributes to previous work in this area in several ways: by focusing on the experiences of Australian women (a group that has received little attention thus far); by addressing the full panoply of digital media that are now available to women for both pregnancy and parenting rather than focusing on one media type alone, as most other studies have done; and by considering the complexities of the intersections between information, emotional support, intimacy, personal data generation, sharing and privacy as they are conducted and experienced on the digital media used by women during these life stages. The handful of studies published thus far on the Australian context have found that women are actively using apps and social media for pregnancy and parenting [18,27–30]. However, little research has yet investigated the details of how Australian women take up these media in relation to each other, and across their experiences of pregnancy and into the early parenting period.

My integrated research program on new digital media available to and used by Australian women for pregnancy and parenting infants and young children involved several different studies that were designed to shed more light on these issues. These included critical content analyses of reproduction and pregnancy apps and self-monitoring devices [31–34], an online survey completed in late 2014 by 410 women around Australia who were either pregnant or had given birth in the previous three years [35] and a focus group study involving Sydney women fitting the same description, which

took place in mid-2015 [36]. The research questions around which both the survey and focus groups were framed were: How are women using digital media for both pregnancy and parenting? Which digital media do they find most useful and valuable, and why? What media would they like to use that are not currently available to them? What concerns (if any) do women have about the privacy and security of their personal data?

In this article, I discuss the findings from the focus group discussions, which were conducted after the survey had taken place. The survey showed that the use of pregnancy and parenting apps was common among the respondents. Almost three quarters of respondents had used at least one pregnancy app, while half reported using at least one parenting app. Respondents found the apps useful or helpful, particularly for providing information, monitoring foetal or child development and changes in their own bodies and providing reassurance. Websites were also popular among this group (57% used them for pregnancy, 66% for parenting), followed by online discussion groups (26% for pregnancy, 28% for parenting) and Facebook (pregnancy 22%, parenting 33%). When the respondents were asked if they were concerned about how personal data about themselves or their children may be accessed and used by third parties, very few were concerned or had thought about this issue [36].

2. Methods

The focus groups were designed to further investigate how women used these digital media. The focus group format, involving participants discussing issues in a group setting, allows for more detailed responses than can be elicited from surveys. While they may not generate the kind of in-depth material about individual participants that one-to-one interviews offer, this approach provides the opportunity to identify shared knowledge and experiences and for participants to respond to others' points of view, often leading to discussion initially unanticipated by the researchers [37,38].

Four focus groups, each with nine participants (a total of 36 women) were held in Sydney in a central city location. The discussions were between 90 min and two hours in length. The women were recruited for the groups by a Sydney-based market research company that specialises in running focus groups. None of them had been involved in the survey phase of the research. Women who had already volunteered to be members of the company's research panels and who fit the selection criteria (currently pregnant or had given birth in the past three years, aged 18 years or over, and competent in English) were contacted by the company and invited to take part in the study. The participants were remunerated with gift cards for their participation. The focus groups were conducted according to the requirements of the human ethics research committee of the University of Canberra, and received approval from that committee. All participants received information and consent forms online before agreeing to be involved in the study.

In the discussions, the participants were asked to talk about the types of digital media they used for pregnancy and parenting purposes, why they used them and in what ways they found them useful or helpful (or not). The discussion concluded with the question: 'If you could design the ideal digital technology for women to use for pregnancy or parenting, what would it be and what would it do?' This question was included to elicit the participants' ideas both about what digital media currently offered them and also what these media were failing to deliver. All the focus groups were conducted by an experienced moderator from the market research company, who followed the question schedule that I devised.

Focus groups 1 to 3 included women who already had young children (a total of 27 women, some of whom were pregnant at the time of the study), and the fourth was comprised of nine women who were pregnant for the first time. Eleven participants were aged between 23 and 29, 22 were aged between 30 and 39 and three were 40 years or older. They were predominantly a highly educated group. Twenty-six women held university degree qualifications. A further seven participants had technical training, and only three had high school qualifications only. Twenty-five participants identified themselves as being of Anglo-Celtic ethnicity while the remaining eleven were of Asian, South American, Continental European and Middle-Eastern ethnicity.

All the group discussions were audio-taped and transcribed by a professional transcription company. I analysed the transcripts using inductive analysis guided by the key research questions and the theoretical approaches outlined earlier. These involved constant comparison: multiple reading of the transcripts and the iterative generation of analytical categories and themes, including key topics, explanatory frameworks and discourses used by the participants to describe their experiences and practices [39–41]. I focused on both the overt features of the women's accounts (what they talked about and how they expressed themselves) and the sub-textual dimensions (the broader sociocultural contexts of their explanations and experiences). As these features were identified, they were checked against the transcripts of all the focus groups to determine to what extent they were shared across participants in all the groups, and where any contradictions and exceptions occurred. Verbatim quotations from the discussions were chosen to provide support for the analysis and are provided in the findings to illustrate the inferences made. The findings are grouped under topics, and the discussion section draws out the sociocultural themes identified in the women's accounts.

3. Results

3.1. *Connecting with Other Women*

For many focus group participants, access to peers' experiences and knowledge was very important. In all of the focus groups, many participants noted that they had gained answers to questions or concerns they had about their pregnancy or their children by going to online forums or social media platforms or viewing other users' interactions. They commented that these online forums offered the opportunity to discuss often very private or sensitive details about themselves, such as sexual activity during or after pregnancy or feelings of sadness or frustration, and that they felt that they could not raise these issues with friends, family or healthcare providers in face-to-face encounters.

The immediacy of peer information and support was also highly valued by the participants. As a woman in group 4 observed, she appreciated being able to go online and quickly receive answers to her questions: 'You can do it any time, you don't have to do small talk, you just go—boom—and you just get the answer. And it's just a bit faster and you can turn it off when you want.' Several stories were recounted by the women of feeling anxious or worried in the middle of the night with a tiny baby to care for who may not be sleeping or feeding well or was ill. In this situation, being able to go online and find forums, where other mothers had dealt with the same issues, was very helpful.

Participant group 2: What I did love about the apps is the forums. So if you have a weird pain or, you know, you have cramp in your legs at three a.m., you can get on your phone straight away, and you can get support by the women who are going through the same thing.

Women who felt that they lacked knowledge as first-time mothers or who were not in regular contact with experienced family members particularly valued the opportunities digital media afforded for connecting with other women. For example, one woman (group 1) was a sole mother and immigrant whose family lived in a different country. She noted how important parenting apps were for her, particularly those that enabled users to participate in forums:

Because I had no parents when I had my baby, and no partner and no friends that had had kids, so I was lost when I first had my child. When I first had her, I think having the app helping me out a little bit was really useful. Because none of my friends knew anything about children, and I don't have any of my family here, so it really helped me.

In addition to websites and apps, Facebook parenting pages were frequently used by women as a source of lay expertise, as is evident in the following exchange:

Participant group 2: I've joined a new mums' group on Facebook, as a new mum, so that really helped me.

Moderator: How did it help you? Give me an example.

Participant group 2: It helped me like, how to feed my baby, how to give food at what time, if he's crying or a little cranky, what to do at that time.

Most of the women said that they used Facebook to communicate with other mothers by joining groups or seeking out specialised pages. As they commented, they are already on Facebook anyway as part of their general social networking. The platform offers an easy way to receive notifications from their groups and participate in direct messaging as well as to engage in activities such as sharing news items or offering items for sale. According to a participant in group 3:

Facebook's a central hub where you can then search on that and then go out. You can search for blogs. You can search for your family and keep in contact with them, and keep in contact with your parent group.

Another woman in this group added to this comment, noting that she liked the fact that her Facebook mothers' group was local, as it helped her feel part of the community with women living near her who possessed local knowledge that they could share:

I just chose the [local] Facebook page because that's where I live. Because where they're meeting up if you want to meet up. You know, if you want a park, in your area, or a good doctor that is for kids, then you can post within that larger group of people from your area and get honest mum opinions.

Facebook not only facilitated online social interactions, but many women used it for connecting with other mothers in their local area and arranging in-person meetups, using closed Facebook groups. Some participants noted that they felt emotionally close to the women they had come to know on forums or social media because of these shared exchanges.

Participant group 2: You end up knowing these women in your forums and things like that. You might not know them if you ran into them on the street, but you know them quite intimately—what's happening in their lives. In that regards it becomes more about, I don't know, that collective bringing up of children that probably 50 years ago probably happened with your neighbours, but now happens with women all over Australia.

Women's desire to have the opportunity to use digital media to make face-to-face connections was evident in their descriptions of the ideal digital technology they would like to use for pregnancy or parenting. One woman suggested that she would like to use a forum where women could get to know each other online, but then arrange to meet in person with their children at social events. Others described a user-created platform with geolocation features, like Google Maps, in which people could readily upload information about good parks, playgrounds, playgroups, baby-friendly cafes and other events and places for mothers and children, and other users could readily find this information. As a participant in group 3 suggested:

It would be great if you could pop in your address and a map popped up: you've got a play group there, you've got a play group there, you've got a park here that's great for babies aged under ten months, the library puts on reading on Friday. All of that kind of stuff! Because there's no one resource that shows you.

The strong desire for direct connection with others was also evident when women were describing what they would like to see offered in a digital technology for pregnancy and parenting. A popular suggestion in all groups was a technology offering a live question-and-answer online forum or video call with healthcare experts such as midwives, paediatricians or child nurses so that users could request expert advice and receive answers immediately. The need for a one-to-one interaction (albeit mediated via digital media) was a clear desire for many women, particularly those who were home during the day with their infants. They spoke of feeling isolated at home and wanting to chat with other people and ask for help with problems that were bothering them:

Participant group 2: Mother's group is great but, and it gets you out of the house, but it's only really once a week. So if you had that Skype option to ask questions, anytime when you're at breaking point, when you just need a little bit of moral support.

3.2. Learning about and Monitoring Pregnancy and Young Children

Some of the most popular websites and apps among the participants were those that tracked the stages of pregnancy week-by-week or infant development phases. They also mentioned using menstruation and ovulation tracker apps when they were trying to conceive. Most of the women made use of these digital media. They discussed how the gestation tracking apps helped them understand how their foetus was developing in detail. They could view images and read descriptions of how the foetus was changing and growing. Several participants made reference to these details helping them to feel excited about their pregnancy, allowing them to conceptualise what was happening in their bodies:

Participant group 2: I think it was Pregnancy [app], the one that tracks your—you know, how far along you are, what's happening, what's happening with baby. Yeah, because it kind of made me feel excited as well, month by month seeing baby grow and all that kind of stuff.

Participant group 4: I like the app where it says, 'the baby's the size of an avocado'. Like that sort of inspires me, it just makes it a little bit—because you can't see [the foetus] and when it's early you can't necessarily feel it—so it just kind of—I'm a visual person, so it just helps.

In terms of what devices or software they would like to use, several women suggested that they would take up a self-tracking app during their pregnancy that would track their foetus's development and send this information to their partner or parents so that they could see how the foetus was developing and begin to develop a bond with it. Sharing this kind of detailed information about the foetus with significant others, therefore, was considered an important attribute of future apps.

In a context in which women are made highly aware of the importance of avoiding risk to the foetus, the women discussed the role of pregnancy information apps in helping them become knowledgeable about these risks. As a group 1 participant noted, she had become pregnant at a young age and unexpectedly, and none of her friends had gone through pregnancy. The app she used gave her directions about how to be a responsible mother:

I was young, so I didn't know when I was pregnant, at that time, so obviously I'd be working hard, drinking [laughs]. So as soon as I found out, like I stopped all that stuff, but because of the baby, every day I would look at the app. What stage am I on? What I should be doing? What I should be eating, what should I be looking to avoid? So it was a life saver for me. I didn't know anything at all.

Once the child was born, many women also used digital media that provided information on developmental stages. Some subscribed to regular newsletters provided by websites while others used apps for this purpose. YouTube videos were also popular ways of learning about caring for children or finding the best child-related products. The women talked about seeking 'how-to-videos' about how to settle babies, using a pram, child development activities, cooking for children, diagnosing medical conditions in their children, learning first-aid or seeking product reviews. For example, a group 4 participant noted that she found being able to watch others carry out child-care tasks in these videos was very helpful:

It's just a visual it makes it easier, I think. Like, I've read things about easier ways to breastfeed already and I'm just going, I did not understand any of that. If you were showed a video of it, I would actually see what they were doing. But reading, it's just, yeah, tricky.

The Wonder Weeks app was used by most of the participants who already had children. This app specialises in giving details on the brain development of foetuses and infants, with explanations for why babies may behave in certain ways at various stages of development. Those women who used the app praised it not only for providing information about their infants but explaining what to them appeared to be the inexplicable behaviour of their babies. Thus, for example, a woman in group 2 commented:

Every week, you know, obviously babies go through their different developments. They're either going to be happy or cranky. So the [Wonder Weeks] app actually had little icons—so it would be like storm clouds, so you knew there was going to be lots of crankiness coming up so you could prepare yourself. And then when there's the nice happy time, it's all smiley faces and stuff. I found out through my mother's group—someone recommended it—and that's how, yeah, I went on, and I went, "Oh my God—this is so true!"

Feeding, sleeping and nappy changing tracking apps were also commonly used in the first few months following the birth, helping women to take control over what was often experienced as a chaotic time for them. For instance, a woman in group 3 talked about how difficult she had found breastfeeding her first child to begin with. A feeding tracking app helped her to monitor how often and for how long her infant was feeding and from which breast, and provide her with enough information to demonstrate that she was giving the baby enough sustenance. A woman in group 1 talked about the Total Baby app and described how she had used it in the early weeks of caring for her newborn. The app helped her understand her baby's behavior, and to begin to learn about his needs and routines:

I'd give ten out of ten to the Total Baby app. It's very simple—it's like, fed at this time, changed at this time, this long, and that's it. It provides me with some confidence that I can look back when my son is crying, I can look back, "Oh, he's hungry because it's been three or four hours." It just gives me a bit of peace of mind, confidence that you know what's next.

Several women discussed using apps for baby monitors, streaming images and sounds of the infant to their smartphone or tablet computer when they were not in the same room as the child. They also expressed a desire for greater opportunities to monitor their foetuses and infants. For example, when they were discussing their ideal type of digital technology for pregnancy or parenting, the members of group 4 talked about how they would like to use such a wearable device for their infant that would convey data to their smartphone about their breathing rate, sleeping patterns and body temperature: 'like a Fitbit for a baby', as one woman put it. Here again, the use of such technologies was presented as way of managing risk by conducting close digital surveillance of their children.

The participants in this group and the other groups also wanted digital devices such as apps and websites to be customised and tailored to their personal details: the stage of gestation they had reached in pregnancy, for example, or the age of their children or where they lived. As women in group 3 said, they would like to use a customised app where they could enter the birth date of their children and then receive notifications about such topics as their development, food to prepare for them, activities to do with them, what their sleeping patterns should be, dealing with behavioural problems and so on. In this group and others, women observed that they wanted digital media that could provide them with information not only about developmental phases and milestones of their infants but how best to stimulate them and encourage them.

3.3. Personal Data Privacy and Security

Sharing images and other information about their children was a regular practice on the part of the participants. Facebook was commonly used for this purpose, but some women also used Instagram, uploading photographs of their babies to share with followers, or the Tiny Beans app, which could

be used to share baby photos with selected recipients via email notifications. Several women also followed other people's Instagram or Pinterest accounts, mainly to view children's clothing styles or other commodity-related content.

When they were specifically asked about whether they had any concerns about the security and privacy of the information about themselves and their children, only a few women expressed concerns about the uses of their personal data by third parties. Most of these centred on the access that other (and often unknown) people may have to their children's images. In group 2, for example, women raised what one called the 'creepy' facial recognition software used by Facebook, and how they were disconcerted when their children were identified by name by this platform when they uploaded images. Some strategies that women engaged in to contain their information were recounted in the following discussion by members of group 1:

Participant group 1: Like, I have a thing, and lots of my friends think I'm a bit of a cuckoo! I don't post pictures of my baby on either Instagram or Facebook. I just don't feel that's the right thing to do. I don't judge anyone, but that's just my personal opinion. I feel like this is very much my personal life and I don't want to. And particularly some of my friends who can't fall pregnant, I feel it's just rubbing in their face—"Look at this!" "How cute!"

Participant group 1: I do, but I'm also very selective. Like I never say where I am or, give any information about what's going on. And I don't name my baby in the photos on Instagram. You know, I'm a bit, you know, like funny. I do put them up occasionally but it's selective times and things.

Participant group 1: Yeah—because people can share your own photos and then it leads to other people and they can take that photo, and use it themselves.

This exchange does suggest that some of the women were aware of the issues concerning third-party use of or access to personal details about themselves or their children. This discussion was not repeated across the focus groups. However, it was evident from other discussions that women had with each other that they were aware of the commercial nature of some of the websites and apps that they used. For example, several women in different groups made references made to the advertising that they received on Facebook or Google Search changing since they had begun to search for pregnancy-related topics or buy pregnancy products online. This had made them realise the extent to which these platforms were able to monitor their online interactions.

In the case of one particular app that several women used, the brand-name of the disposable nappy company who made the app was part of the app name, so this connection was very clear. Women enjoy participating in the online forums with other users that this app offered, but also commented that the company had a 'hidden agenda' to market its products to users, as one woman in group 2 put it. A woman in group 3 commented that she avoided those types of websites and apps: "I think, "Well, you're not necessarily interested in what's best for my baby, you're interested in selling me what you've built and what you want to push on me."" This type of comment was also made in relation to the 'baby clubs' that major retailers in Australia operate, which involve women signing up as part of their customer loyalty program and receiving online updates and special offers. Women commented that they need to be suspicious of the recommendations that such programs offered them. Apart from these types of comments, however, few women commented about the implications of uploading their personal data to websites, apps and social media platforms.

4. Discussion

Previous research on women's use of digital media for pregnancy and parenting has tended to focus on only one form of media. This study's findings were able to shed light on the multi-functionality, cross-platform convergence and mobility of contemporary digital media. Websites, discussion forums and social media platforms can now often be accessed on smartphones via apps, and women were taking advantage of these convergences as part of finding and sharing information, seeking intimacy

and performing 'good' motherhood. Interestingly, despite the attention paid in previous research to 'mummy blogs' as a form of social support and information for women with young children [26,42], this type of digital media was hardly mentioned by the participants.

As researchers in cultural studies and internet studies focusing on the intersections of place, space, emotion and digital technologies have recently argued, digital media can provide a space in which people can exchange personal details, thoughts and feelings, become friends and develop feelings of intimacy: in some cases, without ever meeting face-to-face [43–45]. The focus groups revealed that the intimacy of friendship with other women based on shared experiences of mothering is important to many women, helping to shape mothers' sense of self as highly relational to other mothers and as members of a community of mothers, extending domestic life beyond the space of the home [46]. Intimate ties between the women and others they communicate with on social media—and particularly Facebook—were established via practices of asking and providing advice and emotional support. They contribute to what Lambert [44] characterises as 'a kind of gregarious group intimacy'. More and more frequently, this kind of extended domestic intimacy takes place in online environments.

The findings also emphasise the importance to women of both local and distant connections. Social media provided them with connections to others around the world; but also, crucially, were able to act as forums for very localised knowledges and to facilitate face-to-face friendships (studies by Johnson [28] and Chalken [18] revealed similar findings). There was a reciprocal relationship between in-person interactions and online media. For example, women commented that they learnt about some digital media, such as apps, from their face-to-face interactions with other mothers; so too, they used digital media to form and organise in-person networks.

This study further revealed the responsibility women feel for seeking and documenting information about their pregnancy and their young children, engaging in close monitoring and surveillance of their own bodies in pregnancy and those of their children after birth. For these women, pregnancy and early parenting involved high levels of vigilance and risk-avoidance, which were partly accomplished via digital media such as apps, monitoring devices and online discussion groups and forums. The women represented themselves as experiencing feelings of isolation and anxiety during pregnancy and early parenting. They found great comfort and reassurance from using monitoring software such as apps to monitor themselves during pregnancy and their children's growth and development, and receiving customised notifications from apps or websites providing information and tips about child development. To receive these benefits, they were happy to divulge private details of their pregnancy or children to the developers of these media. Indeed, when discussing which digital media they found helpful to use, the opportunity to personalise the media with personal information like their expected date or delivery or the birth date and name of their child was presented as desirable. Here again, intimacy and personalisation were key features of women's use.

The dominant norms of sharing on social media often expect reciprocity of information sharing and self-disclosure [47–49]. While these practices featured strongly in women's accounts of their digital media use, particularly in relation to social media like Facebook and online discussion forums, information in some apps, and platforms like YouTube acted as repositories of information about pregnancy and parenting, provided both by experts and by peers. In this context, the sharing of personal experiences online becomes a communal data practice, in which people's personal details become part of a crowdsourced body of knowledge that is available to other users of the sites. Many of the apps used by the participants, and those they expressed a desire to use in the future, provided conduits to discussion groups, but they were also ways for women to monitor and generate information about their bodies and those of their fetuses or children that was not necessarily shared with others online.

The term 'intimate surveillance' has been adopted to describe the mode of watching that takes place when people observe other people who are close to them, such as friends, spouses, sexual or romantic partners, children and other family members [20,50]. Many forms of intimate surveillance are undertaken as means of establishing and maintaining social relationships and engendering mutual

feelings of closeness via shared knowledge. Some are intertwined with caring practices, such as the monitoring that parents may undertake of their children's health, wellbeing and development. It was evident from the focus group discussions that for the participants, following the development of their foetus or child, uploading images of them to social media and writing details about children's growth and development on these sites are all ways of establishing and maintaining a close bond with the child. Learning more about one's foetus or child is part of both engaging in caring practices and establishing intimacy with them.

As the focus group findings revealed, intimate surveillance can also be exercised as a way of seeking to exert greater control over experiences that may be viewed to be chaotic and challenging, such as establishing feeding and sleeping routines with their infants or dealing with worries about children's health and behaviour. Like the 'caring consumption' of mother work, involving making the 'right' choices about the best goods and services to purchase for their children [51], these digital practices were part of contemporary mediated motherhood for the women in this study. They have become important elements of the 'digitised reproductive citizen' [33]; the woman who conforms to the ideal of responsabilised 'good' mothering by demonstrating her love and care for her unborn and children and her vigilance in seeking out and acting on information to do so.

Apps and social media, therefore, in addition to the older forms of digital communication of online discussion forums, blogs and websites, are important conduits of these forms of socialities, performances and knowledges. Importantly, they also act as repositories for the personal information that is uploaded by users. These practices converge to generate intimacies and simultaneously, configure assemblages of intimate data. The social and apparently personally beneficial elements of digital media use obscure the ways in which people's information and the labour that they expend in creating and sharing this information on digital platforms is exploited for the benefit of other actors and agencies [47–49,52]. The ethos of participatory sharing on social media has now become harnessed to commercial and neoliberal rationales. The 'archives of affect' [49] that digital companies have amassed and can exploit are the product of the unpaid labour of users of social media. These data become open to repurposing for commercial, research, governmental, managerial, security and criminal actors and agencies as part of the global digital knowledge economy. The use of people's personal details, therefore, extends well beyond any original intention that they may have had in gathering them.

As this study has shown, the affordances of digital media offer many possibilities and pleasures for women who are experiencing pregnancy and motherhood. Like other forms of caring consumption, these practices are inextricably intertwined with the capitalist ethos of purchasing good and services. However, they are not only about the consumption *by* pregnant women or mothers of commodities. The digital data assemblages that are configured on pregnant women, mothers, their foetus and children have *themselves* become valuable commodities that can be exploited by other actors and agencies for profit. The more that women can be encouraged to use apps and other digital media and to contribute details of themselves and their children as part of using these media, the more potentially valuable data they generate. These technologies and practices have significant implications for the creation of digitised data assemblages about children from the earliest forms of life in ways that may be shared in the public domain, used to make decisions about children's health, development, wellbeing and learning achievements or commodified by third parties for their financial gain [20,53].

My research suggests that women who were using these technologies had yet to fully confront the implications for the privacy and security of personal details that are contained in digital archives, the ways in which other actors are gaining access to these data and what the future issues may be in relation to the digital profiles that they have established about their children online. They were aware of obvious commercial ties that apps and websites might have, and some of the privacy challenges that social media sites like Facebook can pose. However, issues such as third-party use of the private data they upload to self-monitoring apps was not recognised. Nor were women thinking about the future privacy and ethical implications for their children of creating digital profiles about them: in some cases, before they were even born. The important questions of parents' responsibilities and rights to share

information about their children online in relation to children's digital rights and the potential harms that may follow them into adulthood [53–56] had yet to be fully recognised and considered among the women in the focus groups.

5. Concluding Comments

The findings of this Australian-based study demonstrate the major importance to women of digital media during the life stages of pregnancy and early parenting. They highlight the intersections between knowledge, intimacy and personal data that were central to the participants' experiences of digital media, including their relationships with their foetuses and young children as well as with other mothers, and face-to-face as well as online. This study was limited to women living in Sydney from mostly socioeconomically-advantaged and well-educated backgrounds and with very young children. Future in-depth research could be directed at identifying how men as well as women, and from other sociodemographic backgrounds and geographic locations, use digital media during parenting, including as their children grow older and into the adolescent years. More studies should also probe further into the interconnected nature of digital media use and identify the most useful digital media for parents in even more detail, as well as investigating how they are responding to the commodification of personal information about themselves and their children that they choose to share online and when using apps.

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