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BabyVeillance? Expecting Parents, Online Surveillance and the Cultural Specificity of Pregnancy Apps

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Abstract
The rapid proliferation of self-tracking pregnancy apps raises critical questions about the commodification and surveillance of personal data in family life while highlighting key transformations in the social experience of pregnancy. In the last 2 years, we have seen the emergence of significant research in the field. On one hand, scholars have highlighted the political economic dimension of these apps by showing how they relate to new practices of quantification of the self. On the other hand, they have focused on users' experience and on the affective, pleasurable, and socially meaningful dimension of these technologies. Although insightful, current research has yet to consider the cultural specificity of these technologies. Drawing on a digital ethnography of the 10 most reviewed pregnancy apps among UK and US users at the beginning of 2016, the article will show not only that the information ecologies of pregnancy apps are extremely varied but also that users' interaction with these technologies is critical and culturally specific. By discussing pregnancy apps as complex ethnographic environments—which are shaped by different cultural tensions and open-ended processes of negotiation, interaction, and normativity—the article will argue that—in the study of infancy online—we need to develop a media anthropological approach and shed light on the cultural complexity of digital technologies while taking into account how users negotiate with digital surveillance and the quantification of the self.

Keywords
digital ethnography, pregnancy apps, quantified self, information ecologies, big data

Introduction

Want to see beautiful, interactive images for every week of pregnancy? Join more than 7 million users who already use this Pregnancy App to follow their pregnancy week by week. Everything you need in one Pregnancy App!—DAILY pregnancy info—Colour and scan images—Personal diary—Personal weight log—Doctor appointment log—Diet, exercise and labour info—Kick counter—Contraction timer—Baby shopping list—1000s of Baby names—Baby size guide—Pregnancy week by week info—And much more . . . (Pregnancy + App, 2016)

The above quote extracted from the promotional blurb of the Pregnancy + App, available to expecting parents on the Apple store, raises two different yet interconnected sets of questions for social researchers interested in the study of the relation between family life and digital technologies. On one hand, it challenges us to question how self-tracking technologies and practices are significantly transforming the experience of pregnancy. On the other hand, it confronts us with the

question about personal data flows and the cultural politics of these technologies. This article engages with these questions by drawing on a digital ethnographic analysis of 10 pregnancy apps. The research marks the first stage of a broader media anthropological project, which is the everyday datafication of children. The analysis consisted in the mapping of the political economic environments of the 10 most reviewed pregnancy apps among UK and US users at the beginning of 2016, in the qualitative textual analysis of their promotional descriptions and data policies, and in a 6-month-long investigation of more than 3,570 reviewers'[1] comments.

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The article will argue that—in the study of pregnancy apps—we have much to gain if we combine a political economic analysis with an investigation of the cultural richness of these technologies. To explore this cultural richness, the article will be divided into three different parts. The first part will show that pregnancy apps cannot be essentialized as a unique set of "self-tracking" technologies, but need to be understood as complex socio-technical environments, which are shaped by different cultural tensions and open-ended processes of social interaction, negotiation, and normativity. The second part of the article will focus on the different cultural discourses of pregnancy apps in relation to self-tracking and privacy and will highlight how these cultural discourses—that are profoundly ambiguous—create a digital environment where user participation is "coerced" (Barassi, 2016). The third part of the article will thus focus on reviewers' comments and will explore some of the culturally specific ways in which users are understanding the use of these technologies and the exploitation of their personal data.

The App Economy, Data Mining, and Pregnancy Apps

In the last decade, mobile apps have transformed the way in which we understand and experience digital interactions. Different scholars have addressed this transformation by arguing that we have witnessed a shift from a more "open and innovative" Internet experience to a social experience of digital interactions that has become extremely commodified, patterned, and determined by service providers (Daubs & Manzerolle, 2016; Goggin, 2010; Wagner & Fernández-Ardèvol, 2015; Zittrain, 2009). According to Zittrain (2009), the creation of an "appliancised network" has limited the innovative capacity of the Internet by heightening the corporate control (2009, p. 9). Similarly, Daubs and Manzerolle (2016) have argued that "app-centric media" employ an imagery of autonomy and empowerment for both users and producers while being grounded in the political culture of neoliberalism, control, and commodification of user data. This is particularly true not only if we focus on discourses surrounding the "App worker" as suggested by Dyer-Witheford (2014) but also if we consider the complex relationship between apps, users, and commodities as discussed by Manzerolle and Kjøsen (2012).

The critical insights that have emerged in the last years that explore the relationship between the cultural politics of apps and broader political economic factors relate to two different yet interconnected bodies of literature. On one hand, they speak directly to the debates surrounding the concept of "digital labor." In the last decade, the concept was used by many critical Internet scholars in order to challenge the techno-optimism of scholars—such as Benkler (2007), Tapscott and Williams (2006), Shirky (2008), and others—who believed that Web 2.0 technologies were reinforcing a "democratic" networked economy based on co-production and participation. On the contrary, with the concept of digital labor, Internet scholars claimed that the participatory culture promoted by Web 2.0 technologies, rather than opening real possibilities for democratic empowerment, had strengthened the corporate exploitation of user's digital production (Andrejevic, 2003, 2007; Fuchs, 2008, 2013, 2014; Huws, 2003; Scholz, 2013; Terranova, 2000, 2013; Van Dijck & Nieborg, 2009). We need to contextualize the works of scholars such as Dyer-Witheford (2014) or Daubs and Manzerolle (2016) on mobile apps within this field. In fact, they follow a very similar line of reasoning as the ones of digital labor scholars and argue that mobile apps need to be perceived as a form of capitalist exploitation and surveillance.

On the other hand, current understandings of mobile apps need to be related to an emerging body of literature that explores the relationship between self-tracking practices, surveillance, and flows of personal identifying information (Crawford, Lingel, & Karppi, 2015; Dijck, 2014; Lupton, 2012, 2013b, 2014a, 2016; Morozov, 2013). In fact, as Lupton (2016) has rightly shown, it is impossible to look at mobile apps without unraveling the complex relationship between digital practices of self-monitoring and the political economy of big data. This is particularly true if we realize the fact that mobile apps, like the above-mentioned Pregnancy + app, not only exploit very personal information about users such as bodily functions, behaviors, and social relationships but also impact and influence notions of the pregnant body and the relationship between the body and the self. The everyday uses of these apps therefore, as Crawford et al. (2015) have argued, create a social tension between the need of users to rationalize and control bodily processes, on one hand, and the lack of control over the data they produce, on the other.

In the study of pregnancy apps, these different and interconnected bodies of literature shed light not only on the commodification of the lived experience of expectant parents but also on the politics of exploitation of the data flows of the unborn. The mediation of the unborn, as Lupton (2013b) has rightly shown, is certainly not new. Yet, with the use of pregnancy apps, the mediation of the unborn, which has always occurred through medical practices and imageries, has reached a new dimension (Leaver, 2015; Lupton & Thomas, 2015). In fact, the extensive use of pregnancy apps by parents is enabling a situation whereby corporations (and possibly governments) have access to important data of the unborn, such as conception date, weight, number of kicks in the womb, possible names, cultural backgrounds, heart rate, diet before conception, parents' thoughts, family ties, family medical history, complications during pregnancy, and due date. If we take these data flows into account, then it is easy to see these apps as the very first form of technologies aimed at citizen's surveillance.

The understanding of the political economic dimension of pregnancy apps, therefore, is fundamental. Yet the analysis

of pregnancy apps—and other mobile apps—merely as technologies aimed at digital surveillance and commodification of data flows prevents scholars from appreciating their social and cultural complexity.

Such complexity is beginning to emerge in the most recent research in the field, which has combined a political economic perspective with an analysis of the lived experience of pregnancy apps. Lupton and Thomas (2015), for instance, have shown that the culture of digital surveillance of these apps is deeply interconnected with a process of ludification and gamification of the experience of the pregnant body and by carrying out an online survey of 410 women; Lupton and Pedersen (2016) have discovered that the use of these apps confers a sense of reassurance for expectant women. Also, Ley (2016) focused on the lived experience of users and has shown that although pregnancy apps are tied to hegemonic cultural processes of heteronormativity, they also need to be understood for their affective dimension in users' lives. What is emerging from this body of literature is the understanding that expectant families are "health conscious subjects" (Johnson, 2014) whose understandings of parenthood, health, and identity are being re-defined by the use of these technologies.

All the recent research on the lived experience of pregnancy apps is, therefore, important and timely. In fact, it is enabling us to shed light on their social, cultural, and experiential complexities and to appreciate the multiple ways in which these technologies are transforming pregnancy. Although insightful, one problematic dimension that is emerging within this body of literature is represented by the fact that it tends to essentialize "pregnancy apps" as a specific technological category. As this article will show, in the study of pregnancy apps, we have a lot to gain if we move beyond these essentialist understandings and instead consider how each app is a complex ethnographic environment, with its own cultural specificity and tensions.

A Cultural Analysis of Pregnancy Apps? Between Method and Ethnographic Perspective

The research presented here represents the first stage of a much broader ethnographic project, which is titled Child | Data | Citizen and explores the everyday datafication of children in family life. The project is based on the theoretical understanding that question about children's data traces, today, is tightly interconnected to new questions about "digital citizenship." This is not only because being able to appropriate personal data flows means being able to represent ourselves in public but also because children's data traces need to be understood with reference to broader processes of surveillance of citizen's personal data. In the past, digital citizenship has been defined as an empowering concept to describe how citizens used digital technologies to

participate in society. Today, digital citizenship is being transformed by our new data cultures. From before citizens are born (e.g., pregnancy apps), they are forced to "digitally participate" in society because their personal data are digitized, shared, stored, analyzed, and exploited for them by others.

At the end of 2015, as I was awaiting ethical clearance to approach the field, I decided to start a desk-based analysis of one of the first technologies that mediate children's data flows: pregnancy apps. The Child | Data | Citizen project focuses on a comparison between UK-based families with US ones; hence, I decided to start with a comparison of the most reviewed pregnancy apps by UK and US users. To identify the most reviewed pregnancy apps, I relied on two different App analytics tools: SearchMan and App Annie. The choice of relying on two different tools was determined by the understanding that most app analytic tools, although they heavily rely on similar data, present different and contradictory analytical results. Both tools have been used merely to identify the pregnancy apps that I was going to analyze. Once I identified the apps I wanted to study, I compared my findings with the top-rated pregnancy apps from Netmums.com.

In the analysis of the apps, I decided to employ a digital ethnographic perspective and to draw on those scholars who believe that digital technologies should be understood as complex socio-technical environments, defined by a plurality of cultural processes and tensions (Hine, 2000, 2015; Pink et al., 2015). Influenced by the understanding that digital ethnography cannot really be perceived as a "method" but rather as a research perspective (Pink et al., 2015), I approached the study of pregnancy apps with the unique intention to open up the research field ahead of me. Hence, I understood my research in terms of what Tim Ingold suggests when he says, "designing is about imagining the future. But far from seeking finality and closure, it is an imagining that is open-ended" (Ingold in Pink et al., 2015, p. 11). In addition to this, in the study of pregnancy apps, I was influenced by the very digital anthropological commitment to cultural relativism (Horst & Miller, 2012).

For the research, therefore, I selected the following 10 pregnancy apps: *Pregnancy and Baby/What to Expect* (What to Expect/Everyday Health, Inc.; 76,507 reviews to date by US/UK users, SearchMan), *My Pregnancy Today* (BabyCentre.com; 47,011 reviews to date by US/UK users, SearchMan), *BabyBump* (Alt12Apps; 12,976 reviews to date by US/UK users, SearchMan), *Pregnancy +* (Health and Parenting, Ltd; 6,567 reviews to date by US/UK users, SearchMan), *Pregnancy ++* (Health and Parenting, Ltd; 4,708 reviews to date by US/UK users, SearchMan), *Ovia* (Ovuline, Inc.; 6,686 reviews to date by US/UK users, SearchMan), *Glow Nurture* (Glow Inc.; 6,818 reviews to date by US/UK users, SearchMan), *Sprout* (Med ART Studios; 6,651 reviews to date by US/UK users, SearchMan), *I'm Expecting* (MedHelp; 3,013 reviews to date by US/UK

users, SearchMan), *The Bump* (The Knot, Inc.; 3,966 reviews to date by US/UK users, SearchMan), *iPregnant Pregnancy Tracker Free* (Winkpass Creations, Inc.; 1,047 reviews to date by US/UK users, SearchMan), and *iPregnant Pregnancy Tracker Deluxe* (Winkpass Creations, Inc.; 1,045 reviews to date by US/UK users, SearchMan).

When I suggest that the research was informed by a digital ethnographic perspective, I imply that each app was studied and analyzed individually as a separate ethnographic environment. My intention was to map the complexity of each app's "*information ecology*" (Nardi & O'Day, 1999). The concept of "*information ecology*" enables us to appreciate the interconnection between "people, practices, values and technologies" (1999, para 1) in the creation and use of mobile apps. This implies that in the study of pregnancy apps, we need to take into account how technology is created and used in local settings and how it is shaped by specific human relations. In addition to this, by referring to the concept of information ecology, we can appreciate the fact that pregnancy apps are in continuous transformation; this is because the "different parts of the ecology *coevolve*, changing together according to the relationships in the system" (Nardi & O'Day, 1999).

During the research, therefore, I took into account not only the broader cultural, social, and economic context in which each app emerged but also their promotional cultures, data policies and reviewers' comments. Hence, I focused on the following areas of investigation: (a) *history and context* (Who were the developers of the app? When was the app created? For what purpose?), (b) *political economic environment* (Was the app sold by the developers? Who owns it? Which are the main advertisers or institutions that relate to the app?), (c) *promotional culture* (How do developers promote the app? What is the business model that informs its promotion?), (d) *data policies* (How does the app gather and use personal data? How does it approach the issue of users' privacy?), and (e) *reviewers' comments* (How is the app rated? What do users say about it?). Methods included Internet research and a critical discourse analysis of each app's promotional culture, data policy, and the "most recent" and "most useful" reviewers' comments as they appeared on SearchMan.com. Overall, I analyzed 3,570 reviewers' comments.

The research methods were highly influenced by the will to deconstruct essentialist perspectives that see these technologies as operating within the same political economic framework and therefore the same cultural framework. Instead, the research has shown that scholars have much to gain if they understand these apps as complex socio-cultural contexts that are shaped by different and contradictory tensions.

The Cultural Specificity of Pregnancy Apps and the Variety of Their Information Ecologies

One of the first main findings of the research was the appreciation that the different apps were immersed in very different information ecologies. In fact, on one hand, I was confronted with some apps like *MyPregnancyToday* (Babycentre.com) and *Pregnancy and Baby* (*What to Expect. com/EverydayHealthInc*) that were part of a complex, parent-focused, communication environment comprising websites, online forums, dedicated experts, magazines, and books. On the other hand, I had to try to make sense of apps like *BabyBump* (Alt12Apps), *Sprout* (Med ART Studios), and *Ovia* (Ovuline, Inc.), which were significantly smaller in scope and were developed by independent businesses.

Within this rough division, there was also much difference between one app and the other. Apps like the ones of *BabyCentre.com* and *What to Expect.com*, for instance, may look quite similar in the sense that they both have a main website, books, experts' advice, community networks, charity investment, public health initiatives, advertising, and so on. Yet they are also profoundly different on a variety of levels that span from their relationship to advertisers to their reliance on medical experts and app developers. The BabyCenter App was launched in 2011 and is developed by the BabyCenter, LCC. The company was founded in 1997 as a digital resource for expecting parents and, today, is owned by *Johnson & Johnson*. The *What to Expect* website was created in the early 2000 following the success of the *What to Expect When You're Expecting* book, which was originally published in 1984 by mothers-to-be Heidi Murkoff and Sharon Mazel. The app was launched in 2009 by the developer EverydayHealthInc, a digital marketing and health care platform for health care companies. In contrast to the BabyCenter, which is mostly sponsored by *Johnson & Johnson*, the WhattoExpect.com is linked to a number of sponsors, including *Babies"R"Us, FIRST RESPONSE*, and *ConsideringCordBloodBank*.

Similarly, although apps such as *BabyBump* (Alt12Apps), *Sprout* (Med ART Studios), and *Ovia* (Ovuline, Inc.) could all be described as emerging from independent businesses and start-ups; they were developed according to very different models and beliefs. *Babybump* was created by Alt12Apps, a business founded by three women who aimed at designing technologies for women and tackling major transformations in women life cycles. *Sprout* was instead launched in 2010 by the independent company Med ART Studios that promotes itself as enabling the design of "progressive" technologies. In 2014, *Sprout* was nominated by *Time* magazine the best pregnancy app of the year; however, little data are available on the web about the history of Med ART Studios. The story of *Ovia* is again very different. The app was launched by Ovuline, Inc. that was created because one of the founders, who was trying to get pregnant, developed an algorithm to monitor human ovulation. The company today strongly emphasizes on their "personal" and "intimate" organizational culture, to the point that all the staff profiles on the website are images of themselves as children.

As it can be seen, therefore, all the different apps emerged in different organizational settings, and their information

ecologies are constructed by different relationships, beliefs, and practices that enabled their design and existence. Yet it is important to point out here that these information ecologies are also created by user interaction, and the digital environments that these interactions establish. During the research, for instance, an important dimension of the information ecologies of these apps was defined by the online forums. The analysis of the users' comments revealed that these forums were very different. While some users discussed the fact that on specific online forums they experienced a lot of "bullying," others commented on how important the interaction with the online community was for them and how supportive the other users were.

All the differences in the apps' information ecologies suggest that in the study of these technologies, and any other mobile app in general, we need to develop an ethnographically grounded approach, one which considers their cultural specificities within the broader political economic context in which they have emerged. In fact, as the next part of the article will show, understanding the cultural specificity of pregnancy apps does not imply that we need to overlook their political economic dimension and the ways in which they are connected to processes of digital surveillance of the unborn and the quantification of the self (Lupton, 2013b, 2016).

Data Policies, Ambiguity, and "Coerced Digital Participation"

Since the very beginning of the research, it became quite evident that all the different pregnancy apps were based on a cultural politics that promoted self-tracking practices in order to make profit out of user data. While there were some companies which constructed their promotional discourse entirely by emphasizing the self-tracking tools that their app offered, other were subtler and emphasized issues such as expert advice and community engagement. Although the apps differed in the discursive construction of their self-tracking features, they all promoted a culture of self-monitoring and surveillance, which can only be understood if we appreciate how these technologies are tied to a broader political economic context of users' data appropriation.

During the research, I realized, however, that in order to understand this broader political economic context of users' data appropriation, I had much to gain if I moved away from those scholars who try to map the capitalist structures of the app economy (Daubs & Manzerolle, 2016) and instead analyze the ways in which the different companies constructed the cultural discourse around self-tracking and personal data flows. Hence, I studied the relationship between the 10 apps' promotional blurbs and their data policies, and I realized that often companies construct an extraordinarily ambiguous discourse in relation to data flows and privacy, which makes it very hard for users to "opt out."

Data Policies, Personal Identifying Information Flows, and Ambiguity

One of the key aspects of pregnancy apps' data policies is represented by the fact that they have been written mostly to inform their users that they will be storing and "passing on" personal identifying information to "third parties," "partners," or "contractors." However, during the research, I quickly realized that many pregnancy apps use an ambiguous language and do not specify (a) the meaning of "passing over," (b) the number of contractors/partners who will have access to the data, and (c) the nature of "partners" and "contractors." This creates a situation whereby the user does not have any informed understanding of how his or her data are used, and hence—as Crawford et al. (2015) have noticed—loses control over his or her personal identifying information. Although I noticed that most pregnancy apps shared a great level of ambiguity when discussing the sharing of personal identifying information with third parties, I also noticed that there was a great variation in data policies of apps. The below quotes taken from the *BabyCentre.co.uk* and *BabyBump* are a vivid example of the ways in which these apps differ:

> Some of the information that you submit may be personally identifiable information (that is, information that can be uniquely identified with you, such as your full name, address, e-mail address, phone number, and so on) [. . .] If you provide personally identifiable information to this site, we may combine such information with other actively collected information unless we specify otherwise at the point of collection. We also may disclose personally identifiable information you provide via this site to third parties, but only: (i) to carefully selected partners who have offers that may be of interest to you, provided you have requested such offers, in which case we will require such partners to agree to treat it in accordance with this Privacy Policy and use it for the same purposes. (ii) to contractors we use to support our business (such as technical support and delivery services), in which case we will require such third parties to agree to treat it in accordance with this Privacy Policy and use it for the same purposes. (*BabyCentre.co.uk*, data policy, 15 February 2016)

> You provide us information about yourself, such as your name and e-mail address, date of birth and sex, when you register for the Services. If you correspond with us by email, we may retain the content of your email messages, your email address and our responses. [. . .] Any personal information or content that you voluntarily disclose for posting on the Services (for instance, in user content you post) becomes available to the public. If you remove your user content, copies may remain viewable in cached and archived pages or if other users have copied or stored your user content. Personally Identifiable Information: Except as otherwise provided herein, Company will not rent or sell your personally identifiable information to others without your express consent. (*BabyBump*, data policy, 15 February 2016)

As it can be seen, both data policies differ in the way in which personal identifying information is used and passed on.

In contrast to the *BabyCenter*, the *BabyBump* explicitly states that no personal identifying information will be "rented" or "sold" without the user's consent. Yet it is important to notice that in both cases, the levels of discursive ambiguity, which are supported by the technical jargon, create a situation where users do not understand what happens to their information and lose control. This is particularly true if, as we shall see here below, we consider the issue of "opting out."

Impossibility to "Opt Out" and Changes in Terms and Conditions

In the above-mentioned data policies, there is a great level of ambiguity with reference to users' possibility to opt out. Within the *BabyBump* data policy, it is not clear how users can give their consent to sell their personal identifying information; therefore, the reader assumes that the consent is automatically given with the act of agreeing to the Terms and Conditions of the app. In the BabyCenter.co.uk, if one follows the link to "opt out," she is directed to the webpage of the "Adobe Privacy Centre." At that point, she needs to scroll down in order to find a yellow "opt-out" plug. Once clicked on the plug, she is directed to another page that explains that the "opt-out" plug works exclusively for a specific browser on a specific computer and only if she does not delete the cookies. While one would tend to assume that "opting out" would entail that the information of the individual user profile is not passed on to third parties by the company itself, in actual fact, opting out simply means preventing one's own Internet browser from sharing the information. Of course, this is nullified in the moment the individual uses another computer, browser, or deletes cookies. Furthermore, there is no specification of how users can "opt out" from mobile tracking technologies when using their apps.

This interconnection between discourse, practice, and technology creates a digital environment where, as Barassi (2016) has shown, participation becomes no longer voluntary but coerced. This form of coercion can be found in the very language of data policies. A good example is provided by the language chosen by the pregnancy app *The Bump*, which was mostly US based and has now been discontinued:

> You may have the right to opt in to or opt out of certain of our uses and disclosures of your Personal Information. For example, when you are asked to provide Personal Information on this Site, you may have the opportunity to elect to, or not to, receive promotional messages from us by e-mail or by Text Message (as defined below). [. . .] Please understand that it may take us some time to process any opt out request and that even if you opt out of receiving promotional correspondence from us, we may still contact you in connection with your relationship, activities, transactions and communications with us. (*The Bump*, data policy, 3 March 2016)

As it can be seen, the choice of language used, I believe, is particularly interesting. Questions arise on why the data

policy suggests that users "may have the right" to opt out. In fact, rights should not be something that users "may" have; rather, it should be something that is granted to them. Similarly, it is interesting that in the data policy of *The Bump*, there is an explicit mention to the fact that even if users choose to "opt out," they will continue to receive messages and advertising from the company.

Changing Terms and Conditions, and the Issue of Children's Data

The research revealed that coerced participation is not only expressed by the difficulty to "opt out" from the services of the app but also by the fact that "terms and conditions" are constantly changing. This implies that all the terms and conditions agreed by users at the moment of joining can be completely revisited by the company in time. What is interesting to notice, however, is the fact that—as my research revealed—some companies do not report these changes directly to users (via email, text, and other means). On the contrary, they suggest that it is users' responsibility to continuously check websites and data policies to make sure that they are updated with the latest changes. Although this may seem like a small technicality, in actual fact, I believe that it is a shared practice that reproduces the ambiguity of discourses on digital participation and impacts directly users' right to be informed about policy changes.

In the study of pregnancy apps, furthermore, we are confronted with a further complexity represented by coerced digital participation. This is the fact that these apps gather, manage, and share incredible amounts of personal identifying information of potential future children. Children's digital participation therefore is determined by their parents, who share vast amounts of personal identifying information of their babies to be. We cannot know now whether these data will be lost in the future or whether it will be integrated with other data, effectively impacting children's digital profiles. What we know for sure, however, is that data policies do not address this problem and collect children's data by relying on an ambiguous discourse that directs the responsibility, once again, to users. This is exemplified by the below quote taken from the BabyCentre.com Data Policy:

> Our services are not intended for children under age 13. We do not knowingly collect personally identifiable information via the Services from users in this age group. We may, however, collect information about children and babies from their parents who are using our Services. The parent or guardian also assumes full responsibility for the interpretation and use of any information or suggestions provided through our Services for the minor. (*BabyCentre*, data policy, 15 February 2016)

The above findings highlight that in the study of pregnancy apps, we need to be aware of the profoundly ambiguous cultural discourses and practices that shape digital surveillance and the commodification of data of the unborn, and raise

critical questions about the political economy of these technologies. However, as mentioned above, although we need to be aware of the political economic dimension of pregnancy apps, we also need to highlight the cultural and lived experience of these apps and appreciate how people understand and negotiate with their political economy. As Sharon and Zandbergen (2016) argue—in their ethnographic critique to Lupton (2016) and others working on the quantified self-movement—it is important to look at the very human and ethnographic dimension of these technologies and recognize the fact that self-tracking practices can be connected to forms of resistance, self-creation, and agency.

As the below part will show, I have tried to explore some of these processes of negotiation and resistance through the analysis of 3,750 reviewers' comments. It must be noted, however, that such a research is full of theoretical and methodological limitations. In fact, a simple analysis of reviewers' comments does not shed light on the ethnographic thickness that defines the cultural experience of users, such as their biographical background, beliefs, passions, and desires, and leaves scholars to question the subject behind such comments. At the same time, we must acknowledge the fact that reviewers' comments are an important cultural practice in the digital economy and a fundamental dimension of digital environments. Therefore, constrained by the inability to start proper ethnographic work with participants, I have decided to analyze reviewers' comments as one of the different dimensions that defines the cultural richness of pregnancy apps. It was through the analysis of the comments that I started to come to the conclusion that users' experience of pregnancy apps is not only culturally specific but also defined by complex personal processes of negotiation.

Pregnancy Apps and Users' Everyday Negotiation With Their Political Economy

Throughout the research, it emerged quite clearly that it is common for users to download and use multiple pregnancy apps, as well as to compare their features and functionality. In 2010, for instance, a user reviewed an app by comparing it to others and mentioned that it was one of the six apps that she had downloaded on her phone. If the multiple use of apps seems to be a common pattern in reviewers' comments, another common issue is defined by the fact that users understand these technologies as being defined not only by different designs and features but also by different levels of expertise, different community networks, and of course different cultural understandings. A good example of this is represented by the fact that many of the UK reviewers, for instance, complained about the fact that many of the apps were "too US based" and explained that they could not culturally relate to the advice, medical expertise, and advertising of the app.

The appreciation that users' experience of pregnancy apps is culturally specific leads us to a final point that is central to the argument here: the fact that if, as Lupton (2014a) has rightly argued, mobile apps are cultural artifacts that tend to reproduce hegemonic discourses about normativity, then their use triggers different cultural tensions. In her work, Ley (2016) briefly discusses these cultural tensions by mentioning how pregnancy apps seem to be reproducing heteronormativity. Yet she does not bring the argument further and instead chooses to focus on the "pleasures" of pregnancy app use.

During the research, I kept on being confronted with different comments that documented the cultural tensions emerging from everyday use of pregnancy apps. These tensions included the issue of race, disability, same-sex marriages, and so on. The following comments are illustrative in this regard:

> This is a great app for any parent or person having a baby. One thing, I am white Caucasian and even I've found it odd there are no other ethnicity babies showcased in this app? Not sure if the "white" baby represents the every man, but I find it a bit sad in today's world every person experiencing the joys of pregnancy aren't represented, so four stars. (Reviewer's comment, SearchMan.com, 2016)

> Usually I love this app but in my tip for today I read about expectant mother car parking spots that are located near "handicapped" spots at stores . . . Disgusting terminology that I thought people had the sense to stop using. (Reviewer's comment, SearchMan, 2015)

> This app makes lots of assumptions, features a white baby and uses the term "husband" throughout. Not very inclusive. (Reviewer's comment, SearchMan.com, 2014)

We can only fully appreciate and understand these comments if we realize not only that pregnancy apps, like many different technologies, are in fact cultural products shaped by hegemonic discourses and understandings but also that people engage critically with these products. The preliminary findings of my research have highlighted precisely these processes of negotiation. Users are often aware of the cultural politics of technologies as well as of their political economy and find ways to circumvent them. These processes of human negotiation are open-ended and complex and involve the negotiation with hegemonic cultural values and ideas of normativity, as well as with processes of data exploitation.

In fact, the research revealed that different users criticized the extreme "commercialization" of pregnancy apps. Comments highlighted the fact that users feel upset and angry at realizing that these apps try to "monetize their joy," "relentlessly spam them," and transform the experience of pregnancy into "a big giant add." Furthermore, some users are looking for ways in which they can circumvent data exploitation and share these practices with other users. A

good example is provided by the following UK reviewer commenting on targeted advertising:

> This is a great app, but unfortunately because it is a great app (and free) they will spam your email address. I love the app, but it isn't worth all the emails (I have updated my notification preferences three times, and yet they mysteriously keep coming back—and the unsubscribe to Real Answers link they give you in their email leads nowhere). If you want this app (because it is good) make a fake email address to give them. DO NOT use your real one! (Reviewer's comment, SearchMan.com, 2016)

While some users expressed frustration about "targeted advertising," a few commented on the personal impact this advertising had for their lives. The below comment from a US user of one of the apps is particularly illuminating. The user discusses how difficult it is to "opt out" from receiving emails from the specified app and how hurtful this feels after a miscarriage:

> I get emailed constantly. Getting them to stop is impossible. I have clicked their links to unsubscribe multiple times and the emails just keep coming. And it's not just the app sending emails, it's their long list of sponsors that spam you as we'll. I don't want to buy products from their annoying sponsors. I get about 5 emails per day!!! I hate if I don't check my email for a few days and I have my inbox full of their annoying emails. I miscarried months ago and there is no option to get them to stop the baby growth updates. Like I need to be reminded everyday of what my dead baby's growth is supposed to be. I finally had to just block them through my hotmail account. I've read reviews online where other women had an equally difficult time getting them to stop sending emails. (Reviewer's comment, SearchMan.com, 2013)

In conclusion to this part, therefore, pregnancy apps are not only defined by complex information ecologies, but they are also designed according to a specific cultural politics that reproduce hegemonic understandings of normativity. This understanding opens up a whole set of new questions about how users conceptualize these technologies, how they see their cultural politics and political economy, and how they negotiate with them. The simple analysis of users' comments is not enough to achieve a thorough, ethnographic understanding of these processes of negotiation. Yet it constitutes a first step toward their analysis.

Conclusion

In the study of pregnancy apps, scholars are faced with a variety of theoretical and methodological challenges. While we need to analyze how digital technologies are deeply interconnected with a political economy of data exploitation and surveillance, we also need to take into consideration the cultural complexity and diversity of technologies, as well as the unpredictability of digital practices. As this article has shown, although the design and data policies of most pregnancy apps create a digital environment in which digital participation is often coerced, we cannot fail to notice the cultural variety and complexity of their different information ecologies. In addition to this, we need to understand how these technologies are defined by open-ended processes of hegemonic discursive construction, as well as negotiation and interaction.

In conclusion, therefore, the research presented here is a first minor and tentative step toward the understanding of these interconnections. As mentioned, the digital ethnography was designed and understood as a way to "open up" the research field and start highlighting a wide variety of questions—which remain unanswered—about the complex relationship between everyday digital practices, data flows, and digital surveillance in family life. Although the article leaves a lot of questions unanswered, its aim was to map some of the cultural discourses on digital participation of pregnancy apps, to understand the variety of their information ecologies, and to start reflecting on the cultural tensions that can emerge in their everyday use. In doing so, the article's goal was to argue for the importance of avoiding essentialist generalizations about digital technologies, understanding their cultural complexity and specificity, and above all taking into account how people negotiate with their cultural politics and political economy.

As Hesmondhalgh (2010) has argued, we cannot belittle the cultural complexity of digital practices by understanding these simply as the production of data to be turned into commodity. Therefore, in the study of pregnancy apps and infancy online in general, we have much to gain if we develop a "historically situated and ethnographically grounded approach complete with a degree of theoretical infidelity capable of appropriating both political economic and cultural studies approaches" (Fish in Andrejevic et al., 2014, p. 1094). This approach, I believe, needs to be found in the legacy of media anthropology (Askew & Wilk, 2002; Barassi, 2015; Brauchler & Postill, 2010; Ginsburg, Abu-Lughold, & Larkin, 2002; Peterson, 2003) and in the work of those scholars who have simultaneously taken into account the constraining nature of technological structures as well as the creative possibilities of human practices. This understanding will inform my future research on the Child | Data | Citizen project.

Note

1. Please note that as ethical decision, when discussing reviewers' comments no reference will be made to specific apps.

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