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Playing Pregnancy: The Ludification and Gamification of Expectant Motherhood in Smartphone Apps

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Abstract

Introduction

Like other forms of embodiment, pregnancy has increasingly become subject to representation and interpretation via digital technologies. Pregnancy and the unborn entity were largely private, and few people beyond the pregnant woman herself had access to the foetus growing within her (Duden). Now pregnant and foetal bodies have become open to public portrayal and display (Lupton *The Social Worlds of the Unborn*). A plethora of online materials – websites depicting the unborn entity from the moment of conception, amateur YouTube videos of births, social media postings of ultrasounds and self-taken photos ('selfies') showing changes in pregnant bellies, and so on – now ensure the documentation of pregnant and unborn bodies in extensive detail, rendering them open to other people's scrutiny.

Other recent digital technologies directed at pregnancy include mobile software applications, or 'apps'. In this article, we draw on our study involving a critical discourse analysis of a corpus of pregnancy-related apps offered in the two major app stores. In so doing, we discuss the ways in which pregnancy-related apps portray pregnant and unborn bodies. We place a particular focus on the ludification and gamification strategies employed to position pregnancy as a playful, creative and fulfilling experience that is frequently focused on consumption. As we will demonstrate, these strategies have wider implications for concepts of pregnant and foetal embodiment and subjectivity.

It is important here to make a distinction between ludification and gamification. Ludification is a broader term than gamification. It is used in the academic literature on gaming (sometimes referred to as 'ludology') to refer to elements of games reaching into other aspects of life beyond leisure pursuits (Frissen et al. *Playful Identities: The Ludification of Digital Media Cultures*; Raessens). Frissen et al. (Frissen et al. "Homo Ludens 2.0: Play, Media and Identity") for example, claim that even serious pursuits such as work, politics, education and warfare have been subjected to ludification. They note that digital technologies in general tend to incorporate ludic dimensions.

Gamification has been described as 'the use of game design elements in non-game contexts' (Deterding et al. 9). The term originated in the digital media industry to describe the incorporation of features into digital technologies that not explicitly designed as games, such as competition, badges, rewards and fun that engaged and motivated users to make them more enjoyable to use. Gamification is now often used in literatures on marketing strategies, persuasive computing or behaviour modification. It is an important element of 'nudge', an approach to behaviour change that involves persuasion over coercion (Jones, Pykett and Whitehead). Gamification thus differs from ludification in that the former involves applying ludic principles for reasons other than the pleasures of enjoying the game for their own sake, often to achieve objectives set by actors and agencies other than the gamer. Indeed, this is why gamification software has been described by Bogost (Bogost) as 'exploitationware'.

Analysing Pregnancy Apps

Mobile apps have become an important medium in contemporary digital technology use. As of May 2015, 1.5 million apps were available to download on Google Play while 1.4 million were available in the Apple App Store (Statista). Apps related to pregnancy are a popular item in app stores, frequently appearing on the Apple App Store's list of most-downloaded apps. Google Play's figures show that many apps directed at pregnant women have been downloaded hundreds of thousands, or even millions, of times. For example, 'Pregnancy +', 'I'm Expecting - Pregnancy App' and 'What to Expect - Pregnancy Tracker' have each been downloaded between one and five million times, while 'My Pregnancy Today' has received between five and ten million downloads. Pregnancy games for young girls are also popular. Google Play figures show that the 'Pregnant Emergency Doctor' game, for example, has received between one and five million downloads. Research has found that pregnant women commonly download pregnancy-related apps and find them useful sources of information and support (Hearn, Miller and Fletcher; Rodger et al.; Kraschewski et al.; Declercq et al.; Derbyshire and Dancey; O'Higgins et al.).

We conducted a comprehensive analysis of all pregnancy-related smartphone apps in the two major app stores, Apple App Store and Google Play, in late June 2015. Android and Apple's iOS have a combined market share of 91 percent of apps installed on mobile phones (Seneviratne et al.). A search for all pregnancy-related apps offered in these stores used key terms such as pregnancy, childbirth, conception, foetus/fetus and baby. After eliminating apps listed in these searches that were clearly not human pregnancy-related, 665 apps on Google Play and 1,141 on the Apple App Store remained for inclusion in our study. (Many of these apps were shared across the stores.)

We carried out a critical discourse analysis of these apps, looking closely at the app descriptions offered in the two stores. We adopted the perspective that sees apps, like any other form of media, as sociocultural artefacts that both draw on and reproduce shared norms, ideals, knowledges and beliefs (Lupton "Quantified Sex: A Critical Analysis of Sexual and Reproductive Self-Tracking Using Apps"; Millington "Smartphone Apps and the Mobile Privatization of Health and Fitness"; Lupton "Apps as Artefacts: Towards a Critical Perspective on Mobile Health and Medical Apps"). In undertaking our analysis of the app descriptions in our corpus, attention was paid to the title of each app, the textual accounts of its content and use and the images that were employed, such as the logo of the app and the screenshots that were used to illustrate its content and style.

Our focus in this article is on the apps that we considered as including elements of entertainment. Pregnancy-related game apps were by far the largest category of the apps in our corpus. These included games for young girls and expectant fathers as well as apps for ultrasound manipulation, pregnancy pranks, foetal sex prediction, choosing baby names, and quizzes. Less obviously, many other apps included in our analysis offered some elements of gamification and ludification, and these were considered in our analysis.

'Pregnant Adventures': App Games for Girls

One of the major genres of apps that we identified was games directed at young girls. These apps invited users to shop for clothes, dress up, give a new hair style, 'make-over' and otherwise beautify a pregnant woman. These activities were directed at the goal of improving the physical attractiveness and therefore (it was suggested) the confidence of the woman, who was presented as struggling with coming to terms with changes in her body during pregnancy. Other apps for this target group involved the player assuming the role of a doctor in conducting medical treatments for injured pregnant women or assisting the birth of her baby.

Many of these games represented the pregnant woman visually as looking like an archetypal Barbie doll, with a wardrobe to match. One app ('Barbara Pregnancy Shopping') even uses the name 'Barbara' and the screenshots show a woman similar in appearance to the doll. Its description urges players to use the game to 'cheer up' an 'unconfident' Barbara by taking her on a 'shopping spree' for new, glamorous clothes 'to make Barbara feel beautiful throughout her pregnancy'. Players may find 'sparkly accessories' as well for Barbara and help her find a new hairstyle so that she 'can be her fashionable self again' and 'feel prepared to welcome her baby!'. Likewise, the game 'Pregnant Mommy Makeover Spa' involves players selecting clothes, applying beauty treatments and makeup and adding accessories to give a makeover to 'Pregnant Princess' Leila. The 'Celebrity Mommy's Newborn Baby Doctor' game combines the drawcard of 'celebrity' with 'mommy'. Players are invited to 'join the celebrities in their pregnancy adventure!' and 'take care of Celebrity Mom during her pregnancy!'.

An app by the same developer of 'Barbara Pregnancy Shopping' also offers 'Barbara's Caesarean Birth'. The app description claims that: 'Of course her poor health doesn't allow Barbara to give birth to her baby herself.' It is up to players to 'make everything perfect' for Barbara's caesarean birth. The screenshots show Barbara's pregnant abdomen being slit open, retracted and a rosy, totally clean infant extracted from the incision, complete with blonde hair. Players then sew up the wound. A final screenshot displays an image of a smiling Barbara standing holding her sleeping, swaddled baby, with the words 'You win'.

Similar games involve princesses, mermaids, fairies and even monster and vampire pregnant women giving birth either vaginally or by caesarean. Despite their preternatural status, the monster and vampire women conform to the same aesthetic as the other pregnant women in these games: usually with long hair and pretty, made-up faces, wearing fashionable clothing even on the operating table. Their newborn infants are similarly uniform in their appearance as they emerge from the uterus. They are white-skinned, clean and cherubic (described in 'Mommy's Newborn Baby Princess' as 'the cutest baby you probably want'), a far cry from the squalling, squashed-faced infants smeared in birth fluids produced by the real birth process.

In these pregnancy games for girls, the pain and intense bodily effort of birthing and the messiness produced by the blood and other body fluids inherent to the process of labour and birth are completely missing. The fact that caesarean birth is a major abdominal surgery requiring weeks of recovery is obviated in these games. Apart from the monsters and vampires, who may have green- or blue-hued skin, nearly all other pregnant women are portrayed as white-skinned, young, wearing makeup and slim, conforming to conventional stereotypical notions of female beauty. In these apps, the labouring women remain glamorous, usually smiling, calm and unscathed by the visceral nature of birth.

'Track Your Pregnancy Day by Day': Self-Monitoring and Gamified Pregnancy

Elements of gamification were evident in a large number of the apps in our corpus, including many apps that invite pregnant users to engage in self-tracking of their bodies and that of their foetuses. Users are asked to customise the apps to document their changing bodies and track their foetus' development as part of reproducing the discourse of the miraculous nature of pregnancy and promoting the pleasures of self-tracking and self-transformation from pregnant woman to mother. When using the 'Pregnancy+' app, for example, users can choose to construct a 'Personal Dashboard' that includes details of their pregnancy. They can input their photograph, first name and their expected date of delivery so that that each daily update begins with 'Hello [name of user], you are [] weeks and []

days pregnant' with the users' photograph attached to the message. The woman's weight gain over time and a foetal kick counter are also included in this app. It provides various ways for users to mark the passage of time, observe the ways in which their foetuses change and move week by week and monitor changes in their bodies. According to the app description for 'My Pregnancy Today', using such features allows a pregnant woman to: 'Track your pregnancy day by day.'

Other apps encourage women to track such aspects of physical activity, vitamin and fluid intake, diet, mood and symptoms. The capacity to visually document the pregnant user's body is also a feature of several apps. The 'Baby Bump Pregnancy', 'WebMD Pregnancy', 'I'm Expecting', 'iPregnant' and 'My Pregnancy Today' apps, for example, all offer an album feature for pregnant bump photos taken by the user of herself (described as a 'bumpie' in the blurb for 'My Pregnancy Today'). 'Baby Buddy' encourages women to create a pregnant avatar of themselves (looking glamorous, well-dressed and happy). Some apps even advise users on how they should feel. As a screenshot from 'Pregnancy Tracker Week by Week' claims: 'Victoria, your baby is growing in your body. You should be the happiest woman in the world.'

Just as pregnancy games for little girls portrayal pregnancy as a commodified and aestheticised experience, the apps directed at pregnant women themselves tend to shy away from discomfoting fleshly realities of pregnant and birthing embodiment. Pregnancy is represented as an enjoyable and fashionable state of embodiment: albeit one that requires constant self-surveillance and vigilance.

'Hello Mommy!': The Personalisation and Aestheticisation of the Foetus

A dominant feature of pregnancy-related apps is the representation of the foetus as already a communicative person in its own right. For example, the 'Pregnancy Tickers - Widget' app features the image of a foetus (looking far more like an infant, with a full head of wavy hair and open eyes) holding a pencil and marking a tally on the walls of the uterus. The app is designed to provide various icons showing the progress of the user's pregnancy each day on her mobile device. The 'Hi Mommy' app features a cartoon-like pink and cuddly foetus looking very baby-like addressing its mother from the womb, as in the following message that appears on the user's smartphone: 'Hi Mommy! When will I see you for the first time?' Several pregnancy-tracking apps also allow women to input the name that they have chosen for their expected baby, to receive customised notifications of its progress ('Justin is nine weeks and two days old today').

Many apps also incorporate images of foetuses that represent them as wondrous entities, adopting the visual style of 1960s foetal photography pioneer Lennart Nilsson, or what Stormer (Stormer) has referred to as 'prenatal sublimity'. The 'Pregnancy+' app features such images. Users can choose to view foetal development week-by-week as a colourful computerised animation or 2D and 3D ultrasound scans that have been digitally manipulated to render them aesthetically appealing. These images replicate the softly pink, glowing portrayals of miraculous unborn life typical of Nilsson's style.

Other apps adopt a more contemporary aesthetic and allow parents to store and manipulate images of their foetal ultrasounds and then share them via social media. The 'Pimp My Ultrasound' app, for example, invites prospective parents to manipulate images of their foetal ultrasounds by adding in novelty features to the foetal image such as baseball caps, jewellery, credit cards and musical instruments. The 'Hello Mom' app creates a 'fetal album' of ultrasounds taken of the user's foetus, while the 'Ultrasound Viewer' app lets users manipulate their 3/4 D foetal ultrasound images: 'Have fun viewing it from every angle, rotating, panning and zooming to see your babies [sic] features and share with your family and friends via Facebook and Twitter! ... Once uploaded, you can customise your scan with a background colour and skin colour of your choice'.

Discussion

Pregnancy, like any other form of embodiment, is performative. Pregnant women are expected to conform to norms and assumptions about their physical appearance and deportment of their bodies that expect them to remain well-groomed, fit and physically attractive without appearing overly sexual (Longhurst " (Ad)Dressing Pregnant Bodies in New Zealand: Clothing, Fashion, Subjectivities and Spatialities"; Longhurst "'Corporeographies' of Pregnancy: 'Bikini Babes'"; Nash; Littler). Simultaneously they must negotiate the burden of bodily management in the interests of risk regulation. They are expected to protect their vulnerable unborn from potential dangers by stringently disciplining their bodies and policing to what substances they allow entry (Lupton *The Social Worlds of the Unborn*; Lupton "'Precious Cargo': Risk and Reproductive Citizenship"). Pregnancy self-tracking apps enact the soft politics of algorithmic authority, encouraging people to conform to expectations of self-responsibility and self-management by devoting attention to monitoring their bodies and acting on the data that they generate (Whitson; Millington "Amusing Ourselves to Life: Fitness Consumerism and the Birth of Bio-Games"; Lupton *The Quantified Self: A Sociology of Self-Tracking*).

Many commentators have remarked on the sexism inherent in digital games (e.g. Dickerman, Christensen and Kerl-McClain; Thornham). Very little research has been conducted specifically on the gendered nature of app games. However our analysis suggests that, at least in relation to the pregnant woman, reductionist heteronormative, cisgendered, patronising and paternalistic stereotypes abound. In the games for girls, pregnant women are ideally young, heterosexual, partnered, attractive, slim and well-groomed, before, during and after birth. In self-tracking apps, pregnant women are portrayed as ideally self-responsible, enthused about their pregnancy and foetus to the point that they are counting the days until the birth and enthusiastic about collecting and sharing details about themselves and their unborn (often via social media).

Ambivalence about pregnancy, the foetus or impending motherhood, and lack of interest in monitoring the pregnancy or sharing details of it with others are not accommodated, acknowledged or expected by these apps. Acknowledgement of the possibility of pregnant women who are not overtly positive about their pregnancy or lack interest in it or who identify as transgender or lesbian or who are sole mothers is distinctly absent.

Common practices we noted in apps – such as giving foetuses names before birth and representing them as verbally communicating with their mothers from inside the womb – underpin a growing intensification around the notion of the unborn entity as already an infant and social actor in its own right. These practices have significant implications for political agendas around the treatment of pregnant women in terms of their protection or otherwise of their unborn, and for debates about women's reproductive rights and access to abortion (Lupton *The Social Worlds of the Unborn*; Taylor *The Public Life of the Fetal Sonogram: Technology, Consumption and the Politics of Reproduction*). Further, the gamification and ludification of pregnancy serve to further commodify the experience of pregnancy and childbirth, contributing to an already highly commercialised environment in which expectant parents, and particularly mothers, are invited to purchase many goods and services related to pregnancy and early parenthood (Taylor "Of Sonograms and Baby Prams: Prenatal Diagnosis, Pregnancy, and Consumption"; Krøløkke; Thomson et al.; Taylor *The Public Life of the Fetal Sonogram: Technology, Consumption and the Politics of Reproduction*; Thomas).

In the games for girls we examined, the pregnant woman herself was a commodity, a selling point for the app. The foetus was also frequently commodified in its representation as an aestheticised entity and the employment of its image (either as an ultrasound or other visual representations) or identity to market apps such as the girls' games, apps for manipulating ultrasound images, games for predicting the foetus' sex and choosing its name, and prank apps using fake ultrasounds purporting to reveal a foetus inside a person's body. As the pregnant user engages in apps, she becomes a commodity in yet another way: the generator of personal data that are marketable in themselves. In this era of the digital data knowledge economy, the personal information about people gathered from their online interactions and content creation has become highly profitable for third parties (Andrejevic; van Dijck). Given that pregnant women are usually in the market for many new goods and services, their personal data is a key target for data mining companies, who harvest it to sell to advertisers (Marwick).

To conclude, our analysis suggests that gamification and ludification strategies directed at pregnancy and childbirth can serve to obfuscate the societal pressures that expect and seek to motivate pregnant women to maintain physical fitness and attractiveness, simultaneously ensuring that they protect their foetuses from all possible risks. In achieving both ends, women are encouraged to engage in intense self-monitoring and regulation of their bodies. These apps also reproduce concepts of the unborn entity as a precious and beautiful already-human. These types of portrayals have important implications for how young girls learn about pregnancy and childbirth, for pregnant women's experiences and for concepts of foetal personhood that in turn may influence women's reproductive rights and abortion politics.

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