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An emerging model of maternity care: Smartphone, midwife, doctor?

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ABSTRACT

Background: Mobile technology in the form of the smartphone is widely used, particularly in pregnancy and they are an increasing and influential source of information.
Aim: To describe the diverse nature of pregnancy related applications (apps) for the smartphone and to flag that these apps can potentially affect maternity care and should be considered in future planning of care provision.
Methods: The 2 smartphone platforms, Apple and Android, were searched for pregnancy related apps and reviewed for their purpose and popularity.
Findings: iTunes and Google Play returned 1059 and 497 pregnancy related apps respectively. Forty percent of the apps were informative, 13% interactive, 19% had features of a medical tool and 11% were social media apps. By far the most popular apps, calculated as the number of reviews multiplied by average reviewer rating, were those with interactive features.
Discussion: The popularity of pregnancy-related apps could indicate a shift towards patient empowerment within maternity care provision. The traditional model of 'shared maternity care' needs to accommodate electronic devices into its functioning. Reliance on healthcare professionals may be reduced by the availability of interactive and personalised information delivered via a smartphone. This combined with the fact that smartphones are widely used by many women of childbearing age, has the potential to modify maternity care and experiences of pregnancy. Therefore it is important that healthcare professionals and policy-makers are more aware of these new developments, which are likely to influence healthcare and alter health-seeking behaviour. In addition healthcare professionals need to consider whether to discuss the use of apps in pregnancy with the women in their care.

The smartphone is rapidly and surreptitiously transforming maternity care leaving policy makers and health care professionals behind.

The smartphone, with over one billion users worldwide, has transformed the way we communicate and access information.[1] The smartphone combines mobile communication, camera, sensors, multimedia capabilities and internet access within a personal hand-held device. Software may be downloaded in the form of applications referred to as 'apps', personalising the functions to the users' own interests. Apps are becoming increasingly relevant to healthcare.[2] There are currently over 40,000 medical apps available for the smartphone with an annual ever-increasing number of downloads, which reached 247 million in 2012.[3]

In addition, there is a growing pool of literature looking into the role of e-technology in health. In their conclusion, Glynn et al.[4] studied the patterns of internet and smartphone use in a paediatric otolaryngology service and reported that 45.2% of parents said they would definitely use an iPhone app regarding their child's condition if one was available and that 36.1% of parents reported they would definitely use the Internet in the future. On one particular healthcare forum, it stated that one-fourth of Americans trust mHealth apps as much as their doctors.[5] Furthermore a literature review on how technology is empowering patients concluded that health literacy of patients, remote access to health services, and self-care mechanisms are the most valued ways to accomplish patient empowerment.[6]

For pregnancy, there are more apps than for any other medical topic, however, neither in Google nor a Pubmed search

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yielded any relevant studies/findings to be included in this discussion.

1. Why are apps relevant and attractive to expectant parents?

Forty-five per cent of smartphone users are aged 18–34,[7] which overlaps with the child-bearing demographics in most developed countries. Motherhood is a stimulus for acquiring a smartphone,[7,8] which raises the question of the motivation behind this. Pregnancy is a unique life experience and evokes a range of emotions from great joy and anticipation to crippling anxiety. These heightened emotions are likely to drive the demand for sharing experiences with others, instant connectivity and professional consultation and reassurance. The panacea to indulge and relieve these emotions could be the smartphone and its associated apps. These devices potentially enable women to communicate, to track the progress of their pregnancy and to alleviate anxieties through interactive, "professional" and private consultations. Here we review whether these presumptions are reflected in the availability and popularity of pregnancy related apps and discuss the possible implications of their increasingly widespread use.

2. What is out there?

In order to review the plethora of pregnancy-related apps on the market the search term 'pregnancy' was used, as this is the most likely way an expectant mother would explore the available pregnancy-related apps. We looked at both the Apple's iOS system as well as the Android system. We searched iTunes and Google Play on January 16th 2013 for apps available. The search returned 1059 and 497 apps respectively. As human participants or information regarding human participants were not required, local ethics approval was not sought. Due to the larger sample the focus of this study was on the Apple iOS system. From the 1059 Apps, those relating to preconception or postnatal issues or those with miscellaneous content – e.g. name giving apps, gender predictors, games, etc. – were excluded. Addressing the above mentioned presumptions, the remaining 430 apps were categorised into: (1) informative, (2) interactive, (3) tools and (4) social media apps. Since Apple does not display data on the number of downloads, a popularity index was created based on the number of user reviews and average reviewer rating (total from all versions of the apps) to estimate user-uptake (Fig. 1). These numbers have been used to indicate the relevance and demand among health-related apps.[9,10] It is worth noting that the age of an app, as determined by its upload date, does not generally correlate with the popularity index.

3. Apps as a companion for pregnancy

Informative apps, which were non-interactive and were reference-based in nature, constituted the largest category of pregnancy related apps (Fig. 1). These apps covered a range of topics relating to maternal and foetal health, from general factual encyclopaedias of pregnancy facts, to more specific information on maternal diet for gestational diabetes. In many ways these are akin to patient factsheets and their number and popularity suggest there is a significant demand for such information. Therefore these apps, which offer advice and guidance, could well increase rather than decrease women's anxiety. Smartphones have the potential to alter health-seeking behaviour in expectant mothers. In the past, expectant mothers might have obtained pregnancy-related information from their midwives, doctors, friends and relatives; however now such information is now instantly available at little or no cost and readily accessible at any time, in any place, at the touch of a button. With the decline of the extended family, such sources of information become more important. The veil of anonymity granted by the app allows a woman to ask questions she might otherwise feel embarrassed asking a healthcare professional. This behaviour may then contribute to the development of an intimate, exclusive and non-judgemental 'relationship' between user and smartphone.

Interactive apps allow data input and offer appropriate, gestation-specific information. Women are able to personalise an app to their specific needs, thereby strengthening the 'relationship' women have with the app. Once synchronised with a pregnancy, these apps can provide sample 3D images of a developing foetus, reminder alerts for appointments and milestones e.g. "your baby should be kicking", as well as advice on maternal health. In this way the information provided is personal and special to the woman's own pregnancy, likening the interaction to a healthcare consultation. These interactive apps were the most popular category (Fig. 2).

The reliance on apps for information about pregnancy related matters, rather than a health professional is a cause for concern. Use of information from the Internet has been shown to be

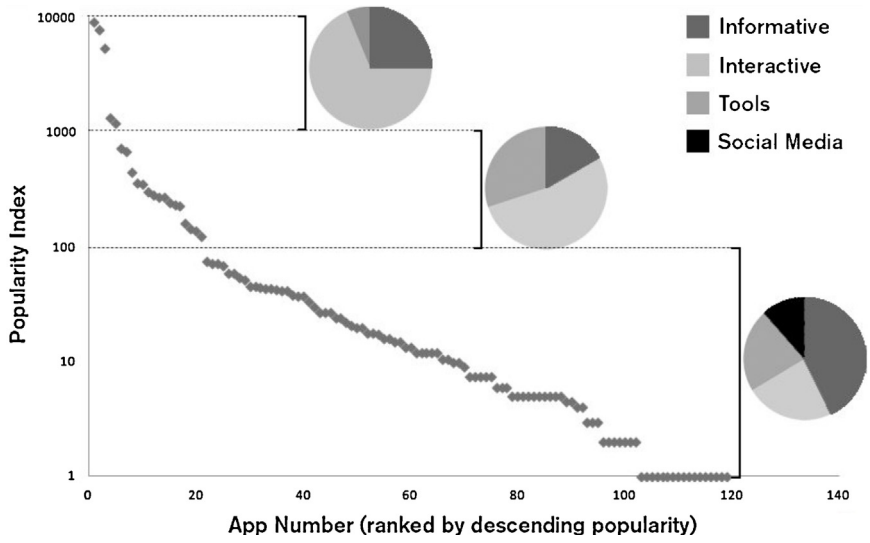

Fig. 1. Popularity index of pregnancy related app categories. Popularity Index (=number of reviews × average reviewer rating).