
So You're Planning a Baby? A Review of Preconception Care Apps

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Abstract

Previous research shows couples favour online information sources when seeking support for preconception health and pregnancy planning, with mobile applications (apps) becoming increasingly popular. This study aimed to establish what smartphone apps currently exist to support couples when preparing for pregnancy. A functionality review was conducted to explore app content and an analysis of user reviews was undertaken to investigate user views towards existing apps. 25 apps were analysed, which provided information on diet, weight, alcohol, smoking and caffeine amongst others. Positive reviews mainly referred to the helpfulness of the app. Negative comments focused on the over simplification of information. Overall, user comments showed a positive response towards existing preconception care apps, but users reported concerns towards information accuracy and reliability. Further work will be undertaken to evaluate whether existing apps engage users to improve their preconception health care and whether these apps fulfils user requirements.

Author Keywords

Apps; Preconception Care; mHealth; User reviews.

ACM Classification Keywords

H.5. Information interfaces and presentation (e.g., HCI);
H.5.2. User Interfaces- Evaluation/methodology; H.5.m
Miscellaneous.

Inclusion Criteria	Exclusion Criteria
In English, included information, advice or support for the time period prior to conception for either males and females or both	Not in English, only focused on the act of conception and any apps that purely offered support post-conception, such as pregnancy trackers

Table 1 Inclusion and exclusion criteria when screening eligible apps

1. Introduction

When couples seek support for planning a pregnancy, online sources are favoured [9]. There are over 2.8 million apps on the Google Play store for Android devices and 2.2 million apps on the iOS App store for iOS devices, (as of April 2017) [11]. Studies show the popularity of using apps for support with health-related information is increasing [4, 8, 10, 12].

Few studies have focused on the use of smartphone apps for reproductive health, and those that have focused mostly on women and their menstrual tracking behaviours [1, 2, 8]. These studies concentrated on how existing apps were being used, for what purpose, and examining how user preferences can be used to improve existing apps. No studies have reviewed apps to support couples planning or preparing for pregnancy.

2. Research Aims and Methods

The aims of this study were three-fold; firstly, to explore and establish what smartphone apps exist to support couples when preparing for conception. Secondly, to understand how these apps aim to support these couples? And finally, to explore the views of the users towards these available apps. These aims contribute towards the overall objective which is to explore user needs towards digital interventions to support preconception care.

This study aimed to develop an understanding of the current available apps to support the specific population of couples planning a pregnancy and their views towards these applications. The findings from this study will help to evaluate user needs versus existing digital interventions.

We searched both the Google Play and iOS App stores with the search terms, "Preconception", "Pregnancy Planning",

"Prepare for pregnancy", "Family planning", "Before Conception", "Conception Support", "Fertility", "Fertility support", "Couples planning pregnancy", "Men pregnancy", "Father/dad pregnancy", "Increase sperm count", "Healthy sperm" and "Sperm health/ Quality". A functionality review [10, 13] was undertaken, which examined the function and features of the apps, including a review of the content and how they aimed to support couples with their preconception health. Next, an analysis of user reviews was carried out to establish the opinions of users towards apps for preconception care.

2.1 Functionality Review

2.1.1 Methods

The Google Play and iOS App stores were searched in October 2017. All eligible apps, according to the criteria in Table 1, were downloaded to a digital device and explored to evaluate their content, features and functionality.

Some apps had components focusing on post-conception health (e.g. pregnancy and beyond); in these cases, the functionality review only concentrated on the content specific to preconception health and pregnancy preparation.

The functionality review involved exploring the content within each app and listing the topics covered, as well as determining whether the app's content was aimed at men, women, or had content for both. It also looked at whether they had interactive features that the user could engage with and the number of downloads and reviews provided.

2.1.2 Findings

To ensure all results were displayed irrespective of their popularity, price or rating no filters were set when searching the app store. However, users may use these filters and

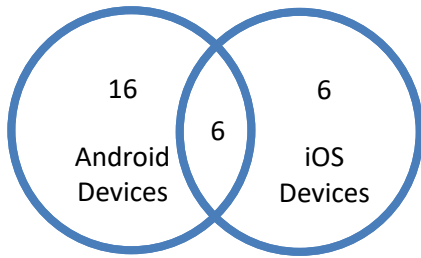


Figure 1 Venn diagram showing the number of apps found in each app store

Graph to show topics covered in apps

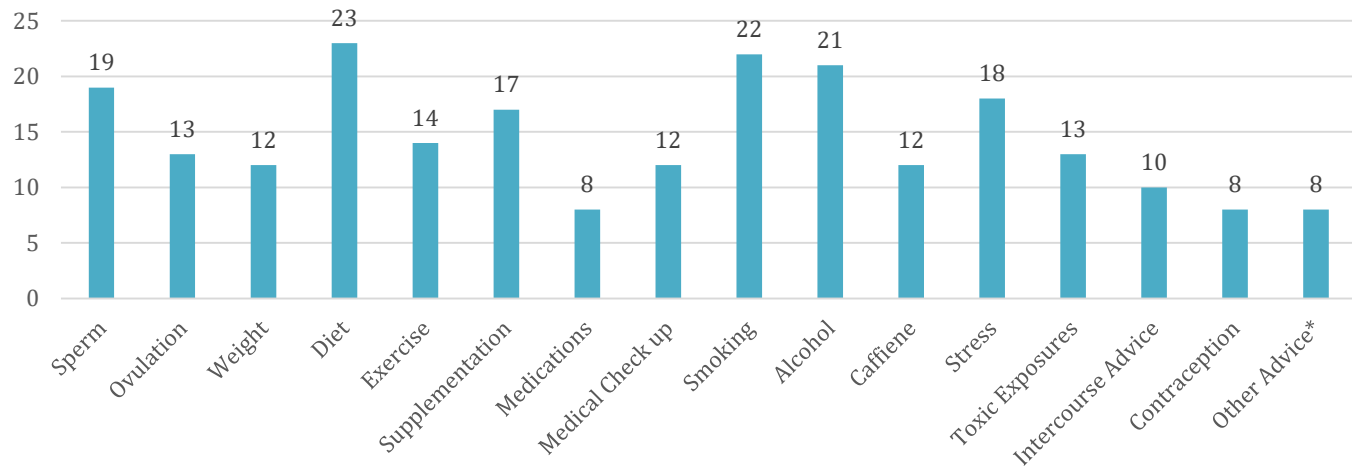


Figure 3 Graph showing how many apps covered each topic. *Sexually Transmitted Infections, Parental Leave, Parenthood Advice, Recipes therefore, more popular apps are more likely to be downloaded and reviewed. To ensure no bias was introduced in which apps were reviewed, all results from each search term were screened.

App Target User

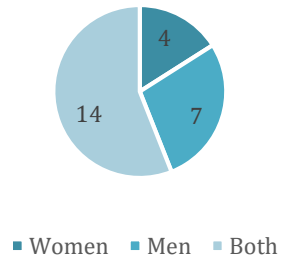


Figure 2 Pie Chart to show the proposed target user of each app

Although a number of apps that support pregnancy planning were found with the search terms used, many of these were menstrual period trackers or ovulation predictors. This variety of apps were at the top of the search results, and further exploration was required to find apps that gave information and support for pregnancy planning and preparation. As these apps did not provide any information or support beyond the identification of fertile time periods for conception, and were excluded from this analysis.

Once results had been screened to ensure apps contained information to support the preparation for conception; 22

eligible unique apps from the Google Play store and 12 from the iOS App store were extracted. Of these 6 apps were on both stores (see Figure 1), and 3 apps did not load. For the 6 apps that were available on both stores, their content and features were similar if not identical, therefore the functionality review will discuss the remaining 25 apps together and not differentiate between the two platforms.

Out of the 25 apps, 4 were aimed at women only and 7 were aimed at men. The remaining 14 had content aimed at both men and women, as displayed in Figure 2. However, it is worth noting that many of these 14 apps were largely aimed at women and included little content or information for men. Many of the apps provided basic information and advice for users to read. Once this content has been read, there is provide little or no incentive for users to return or continue using the apps.

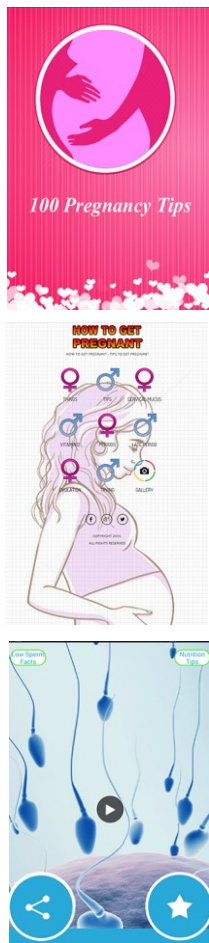


Figure 4 Example of Preconception Care App homepages

Most of the 25 apps focused on detrimental lifestyle activities that can negatively influence healthy conception and pregnancy. Figure 3 depicts the content covered in the apps explored, such as smoking behaviours (22 apps), alcohol intake (21 apps), caffeine intake (12 apps), impact of stress (18 apps) and exposures to toxins (13 apps). Examples of app homepages can be seen in Figure 4.

Fewer than half of the apps focused on the importance of emotional preparedness for pregnancy and parenthood, which would be relevant to both prospective mothers and fathers. The information presented on these topics focused on discussing the plans for pregnancy with partners and how anxiety and other mental health conditions can impact sperm production and ovulation, only one app gave advice on how to manage stress through other activities, such as yoga and meditation.

2.2 Analysis of User Reviews

2.2.1 Methods

Written reviews from eligible apps were extracted to a spreadsheet. Identifiable data were removed to ensure anonymity and confidentiality of the users. Review content was then originally coded into the following codes based on the analysis of the first 5 apps; *functionality*; whether the app delivered its purpose and its features worked correctly without faults, *content*; referring to the subject matter or information provided, *design*; the look and layout of the app, *interface*; the interaction between the app and the user, *usability*; ability of the user to use the app efficiently and effectively and *other*.

This approach became troublesome as some reviews could arguably be coded into multiple nodes for example, “Very helpful information” could be coded into content or functionality and comments regarding the navigation of the

app could be coded into both design and interface. It was then decided to implement a standardised definition of usability to code the reviews for clarity. The International Organization for Standardization (ISO) 9241-11 definition was used. Its definition includes the “extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.” [6]. This was converted into the following questions:

- How well does the product deliver its specified goal, *is it useful?*
- What resources are used to achieve this goal and does it work, *is it usable and reliable?*
- How do the users feel using the product, user *satisfaction?* [7]

The reviews were then coded using these final codes “useful”, “usable and reliable” and “satisfaction”.

2.2.2 Findings

The analysis of user reviews was undertaken solely from the apps from the Google Play store as all iOS based apps displayed the following message; “This application hasn’t received enough ratings or reviews” and user reviews were not able to be extracted.

Therefore, 22 apps from the Google Play store were analysed. Of the 22 apps, 6 had no written reviews. A total of 471 written reviews were extracted from 16 apps. 3 reviews consisted of comments unrelated to the app and 2 were unintelligible, therefore these 5 user reviews were excluded.

Many of the reviews consisted of one word (78 reviews) or generic phrases (88 reviews) which offered no clarity

towards what they were referring to nor provided any insight to the usability or acceptability of the app. Therefore, these reviews were excluded, leaving a total of 300 reviews to be analysed.

USEFUL

158 reviews referred to utility in their comments, of which 139 were positive. Apps provided information on health-related factors that are important to consider when planning a pregnancy or tips on how to get pregnant, therefore these comments refer to the usefulness of the information on how to achieve or work towards their desired goal of conception. *"Informative and helpful hints"* (Review #417). *"It helps me a lot with full understanding [sic] now I know what to do thanks to the app"* (Review #108).

The negative comments referring to utility focused on the elementary level of information or stating the content was common sense and therefore unengaging. *"This is a waste of space. It does not tell you anything that is not already common sense."* (Review #99). *"Save yourself the time! This was a waste of time... read all of the tips in less than 5 min. Horrible app I'd say... The information given was also common sense."* (Review #82).

USABLE / RELIABLE

57 user reviews referred to the usability and reliability of the app. 18 positive comments discussed the ease and simplicity of use and navigation. *"A lot of great tips, and easy to use."* (Review #18). *"Recommend Nice and simple, does exactly what u [sic] want these apps to do. Tried quite a few until found this one. It's better than several others. I'll not be deleting this one like the rest!"* (Review #459).

Negative comments focused on whether the app worked or failed. *"disappointing! always crashes doesn't work well at*

all!!!" (Review #27). *"Disappointed. It's blank slow... wouldn't recommend this app to anyone dislike it"* (Review #64). Other negative comments focused on the ability to use features in the app, such as embedded fertility calculators, *"Sucks Didn't let me choose below 28 cycle days"* (Review #458).

Ambivalent comments, (4 reviews), referred to suggestions of features to the developers directly, to enable efficient usability, such as; *"Missing the option to have unit of measures in meters and kilo"* (Review #40), *"No exit button. I trully [sic] admire your reproductive men's fertility app, but you gotta have your main-menu settings spot on. Add some navigation buttons directively [sic]... please add the exit button guys. I can't manually force to turn off the app using my phone system...I'll give more stars if my request is fulfilled."* (Review #45). *"Notifications buggy The app isn't bad, but PLEASE can you fix the notifications? I've "stopped all notifications" at least 8 times and still, every morning, there's that irritating buzz. Wouldn't be so bad if I could customise it to a useful time!"* (Review #35).

SATISFACTION

136 reviews referred to the user's satisfaction towards the app, the majority of these reviews were based on short statements and phrases where their opinions and feelings were abundantly clear; *"Loved it"* (Review #66, #77, #200 & #456). *"Hate it"* (Review #95).

The majority of these statements focused on positive satisfaction (111 reviews). Although 57 reviews had negative connotations, 21 users specifically expressed dissatisfaction with the app they were reviewing. Reasons for frustration focused on the app content being incorrect or did not have enough detail, *"Showed up for me but just a bunch of rubbish just all old wife [sic] tales 90% of the stuff on here*

isn't true" (Review #69) "*It sucked Nothing much to it*" (Review #463). Generally, the reviews which expressed satisfaction, or lack of, were short and provided limited detail.

2.2.3 Discussion

User reviews can be a helpful suggestion of user experience. However, when relying on reviews as a basis for judgment, we need to be aware of the inherent bias that can be present. Users who are dissatisfied are more likely to provide more information than users who are satisfied with the service or product provided, as well as, users with a specific thought or experience to share are more likely to provide written reviews. [14].

Whilst apps will encourage the user to provide a star rating through the use of pop up messages there is little incentive to provide descriptive written comments. Short non-descriptive comments limit our ability to clearly analyse and infer what the user is referring to, therefore one word reviews were excluded from the analysis.

Not all users of apps provide reviews, which needs to be considered when inferring these findings. It is possible to see the number of downloads an app has had, albeit some will have been uninstalled. The number of star ratings and written reviews an app has is also available from the Google Play store. From this it can be seen that a very small proportion of downloads result in written reviews.

If a user liked the app five-star and four-star ratings were common and if they disliked the app one-star was often given. This indicates that if users were ambivalent to the app they were least likely to provide a review. This is also known as the "Brag-and-Moan" model [5], whereby users are most likely to provide a review if they are particularly

satisfied (brag) or dissatisfied (moan). This phenomenon is also reported by Khalid et al. [3]. Vasa et al. [14] found that users tend to leave longer reviews when they are giving the app a low rating and positive reviews are shorter, most likely with one word praise; this was supported in my findings.

3. Conclusions

This is the first study to our knowledge that has analysed smartphone apps and user reviews from apps providing information and support for couples preparing for pregnancy.

Overall, smartphone apps to help and support couples to prepare for pregnancy do exist, yet they are not easy to find with keywords if you require more than an ovulation or fertility predictor. Most apps provide basic and simple information but do not provide on-going support to achieve or maintain the advised behaviour change to prepare for conception. Generally, the content of preconception care apps comprised of direct instructions and in some cases the rationale behind why the user should engage with the recommended behaviour. Few apps provided sources of evidence or cited references for their information.

Through this analysis, although I have found that there is acceptability from users towards existing preconception care apps, the reliability and quality of content as well as the absence of software bugs is vital to keep a user engaged and satisfied. Users are most likely to be deterred from using an app if the content is unengaging or if the app processes are slow to load or do not work.

Further work is required to assess whether apps can improve knowledge and engage users to improve their preconception care health. Next steps will include collecting data from target users of these apps to explore their needs,

requirements and views of existing interventions. This will contribute to the evaluation of whether existing digital interventions fulfil their target user's needs.

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