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# mHealth Apps for Self-Management of Chronic Conditions in France: What Is out There?

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**Abstract**

*mHealth apps use is rapidly increasing and has high potential value for people with chronic conditions, supporting behaviour change for self-management and improving patient-provider communication. To build a well-functioning app development environment, we need to examine the range of available apps according to their variability and content. A review of Google Play apps revealed limited availability for chronic self-management in France among substantial unrelated content. Most apps' content was difficult to understand and act upon.*

***Keywords:***

Telemedicine, Chronic Disease, Self-Management

## Introduction

mHealth apps are widely downloaded worldwide; over half of mobile phone users in the US have downloaded at least one health-related app in 2015 [1]. As people tend to carry their smartphones with them at all times, apps have the potential to help people improve their lives through learning to cope with different situations [2]. For chronic conditions, behaviour change is essential for reaching and maintaining quality of life and preventing premature death [3][4]. Best benefits can be achieved by targeting mHealth to the 4 groups of chronic conditions responsible for more than 70% of deaths worldwide: cardiovascular diseases, cancer, respiratory diseases, and diabetes [5]. Additionally, to evaluate if these tools are effective in supporting behaviour change, it is useful to consider them as health-related materials. As such, the information presented needs to be accurate; easily understood by persons with different communication competencies, styles, and health literacy levels; and must offer suggestions of actions the user can take concerning health events to optimize their reach and enhance health decision making [6].

We reviewed mHealth apps available in France on Google Play store in April 2018 to examine their content and relevance for self-management of chronic conditions. Here, we aimed to better understand the current offer to guide future improvements in the development and use of these tools, using the two main ways of finding self-management apps on marketplaces: the "TOP" list and keyword search. We also assessed the selected apps' understandability and actionability levels using the Patient Education Material Assessment Tool for audiovisual materials (PEMAT-A/V) [7]. This work is part of a larger project that evaluated mHealth apps in chronic conditions.

## Methods

We extracted the first 500 free and 55 paid apps labeled as "TOP" on the "Médecine" category on Google Play store. We considered 500 apps to be a representative sample, and 55 was the display limit for paid apps. We also performed a keyword search using 12 popular words related to the 4 groups of conditions mentioned before (e.g., maladie cardiaque, accident vasculaire cérébral, maladie respiratoire, cancer, diabète). We included the first 20 apps for each keyword. Name, description, number of downloads, stars, ratings, version, last update, and developer information were extracted for all the apps. Apps in French were classified in 8 categories according to their store descriptions (Chronic conditions, Reproductive health, Students and professionals, Information for the general public, Nutrition, Pranks and fake tests, Other). This was an inductive categorization, following previous studies [8]. Each category was then subdivided following specific app purpose described on the marketplace. We compared the number of chronic condition self-management apps identified with "TOP" versus "keyword" search strategies.

When possible, apps were downloaded and assessed using PEMAT-A/V, a systematic method to evaluate and compare understandability and actionability of patient education materials. It includes 13 items in five topics (Content, Word Choice & Style, Organization, Layout & Design, and Use of Visual Aids) to evaluate understandability, and 4 items for actionability. Each item was rated with 0 (If Disagree) or 1 (If Agree), while not applicable items were labeled "N/A."

## Results

Figure 1 shows the screening process for selecting the apps analyzed in this review.

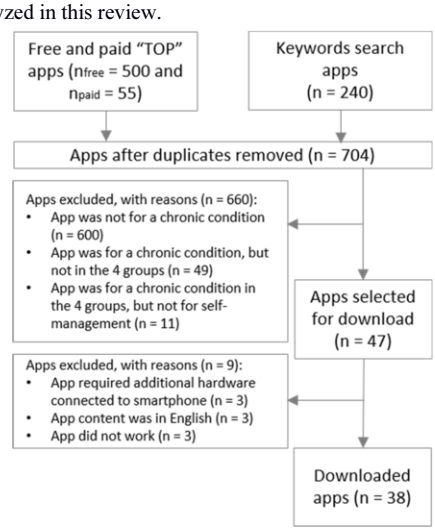


*Figure 1 - Apps screening process*

Of the 704 apps included after duplicate removal, 167 apps (23.72 %) were not in French (Table 1). From the 541 apps in French, 104 (14.77 %) targeted a chronic condition (such as migraine, back pain, speaking and hearing disorders, mental disorders, etc.). The "Other" category (17.47 %) comprised apps for finding the geographic location of pharmacies or defibrillators, for calling emergency services, for clinical analysis laboratories or hospitals, etc.

*Table 1 - Apps categories and examples of subcategories*

| Categories | Examples | Freq | % |
|---|---|---|---|
| **Chronic conditions** | Cardiovascular diseases; Respiratory diseases; Diabetes and weight disorders; Chronic pain | 104 | 14.77 |
| **Other** | Health insurance, hospitals, laboratories; Games | 123 | 17.47 |
| **Students and professionals** | Interactive learning; Diagnostic, treatment or dosage aid | 120 | 17.05 |
| **Information for the general public** | Anatomy, biology, medical terms and tests; Diabetes and nutrition; Cancer | 90 | 12.78 |
| **Reproductive health** | Period tracking; Pregnancy, baby growth, delivery | 48 | 6.82 |
| **Pranks and fake tests** | Glucose, blood pressure, cholesterol, HIV fake tests | 25 | 3.55 |
| **Consultations** | Find professionals and book appointments; Home and online consultations | 20 | 2.84 |
| **Nutrition** | Food and weight diary | 7 | 0.99 |
| **Other language** | English; Spanish; Portuguese | 167 | 23.72 |

In the "Chronic Conditions" category, 47 apps targeted self-management of conditions in the 4 groups with highest mortality risk. Of these, 22 were found only in the keyword search, 18 only in the "TOP" list, and 7 in both searches. Therefore, the keyword search resulted in finding 29 mHealth self-management apps out of 240 (12.1 %).

We were able to download and analyze 38 of these apps and understandability and actionability scores were computed (Table 2). Twenty-six apps (68.4%) presented understandability levels below 50% and 25 (65.8%) apps had null actionability scores.

*Table 2 – Number of apps by PEMAT scores quartiles (range 0-100%)*

| | *0-25%* | *26-50%* | *51-75%* | *76-100%* |
|---|---|---|---|---|
| ***Understandability*** | *8* | *18* | *8* | *4* |
| ***Actionability*** | *25* | *5* | *4* | *4* |

## Conclusions

We conducted a descriptive analysis of mHealth apps available in France on Google Play store. We found a limited number of apps supporting self-management for people with chronic conditions in a considerably diverse market. Using keywords related to these conditions did not necessarily lead to finding more relevant self-management mHealth apps.

Apps presented low scores of understandability and actionability, which means users may not understand the information and may not be supported to take action. This is likely to limit the potential of these apps to help people with chronic illness to make positive changes on how they manage their condition in their daily lives.

It is important to mention that among the list of apps described here, there were several apps of questionable utility posing considerable risks of misinterpretation and dangerous health-related decisions, such as pranks and fake tests, especially for blood glucose and blood pressure measurement.

Potential users of mHealth apps, including both patients and healthcare providers, might require support to search and select relevant apps for themselves or their patients' needs. Research on mHealth apps selection and use patterns is required to inform the efficient adoption of such technology.

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