

---

# How People Use Smartphone Apps to Manage Long Term Conditions

**Kit Huckvale**

Global eHealth Unit  
Imperial College London  
London, UK  
c.huckvale@imperial.ac.uk

**Cecily Morrison**

Microsoft Research  
21 Station Rd  
Cambridge, UK  
cecilym@microsoft.com

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the Owner/Author.

Copyright is held by the owner/author(s).

**Abstract**

Smartphone Apps hold potential to efficiently support those with long-term conditions monitor and manage their symptoms. Despite the availability of Apps, little research has been done around effective design approaches. We present initial findings of a qualitative interview study aimed to generate a rich account of how people with asthma and diabetes decide to use an app to manage their condition. We discuss App usage, personal data usage, and clinical data usage. We draw out different purposes for which the data is used and question whether the design should focus so specifically on the data itself rather than the collection process.

**Author Keywords**

Long-term condition management, smartphone apps, qualitative research, healthcare

**Introduction**

Long term health conditions, such as asthma or diabetes, require substantial self-management to maintain a good quality of life. People with these conditions are often encouraged to track their symptoms, or key data, in order to adjust medication and life activities accordingly. Smartphone Apps hold potential to efficiently support this type of monitoring. To this end, hundreds of Apps have been developed by companies and interested individuals. For example, a

survey of Apps to support the self-management of Asthma found more than 100. These include diaries for recording symptoms, treatment information, multimedia educational resources, and real-time sources of information like pollen and pollution warnings [3].

Despite the availability of Apps, little research has been done around effective design approaches. The equivocal results of several studies testing Asthma self-management Apps suggest that their design is not trivial [2,4,5]. To develop this design insight, a deeper understanding of the information needs of those who use Apps to manage long-term health conditions is needed. The purpose of the on-going study described in this workshop submission addresses this need. More specifically, its aim is to:

*To generate a rich account of how people with asthma and diabetes decide to use an app to manage their condition*

### **Study Design**

Interviews have been carried out with people with Asthma or Type I Diabetes who currently use an App to support their self-management. Taking a contextual inquiry approach [1], participants were prompted to demonstrate with smartphone in hand how they used their App. The researcher then used this concrete discussion to probe related behaviors and feelings. To complement the narrative data, questionnaires were given to assess overall condition control, condition-specific quality of life and functional health literacy. Six-month follow up interviews are also being completed.

Fifteen participants were recruited through the local primary care network and on Facebook. A range of participant characteristics were sought to span age, gender, socio-economic class, and ethnic differences. Management of another's care (e.g. child or spouse) was also included. All interviews took place in the participants' homes or place of choice.

### **Initial Findings**

An initial thematic analysis has been done for the first eleven interviews. We discuss three aspects of it which are particularly relevant to this workshop: App selection, Personal Data Usage, and Clinical Data Usage.

#### *App Selection*

The most common impetus for App usage was a crisis of some kind, a 'critical moment'. For some this was a recognizable medical crisis (e.g. an emergency admission with pneumonia), for others it was disruption to an important aspect of their lives (not being able to pursue a main hobby because of poor condition control).

Substantial effort was not generally put towards App selection. Most participants went to their App store and made selections based on App descriptions and, sometimes, user feedback, looking for one that had the features they wanted (e.g. glucose monitoring). A few described a process of sampling downloads in which they tried Apps for a few days and then switched to another product. Only one participant described a systematic approach to App selection involving initial efforts to find online magazine reviews. While no participant was entirely satisfied with their current choice, each continued to use their chosen App.

### *Personal Data Usage*

All participants appeared to have successfully established routine monitoring into their daily lives. It is notable that most were able to form and sustain daily monitoring habits (some for almost 12 months). This would be considered very unusual with paper diary keeping in which several weeks is usually the limit.

The routine interaction that people established with their app was limited when compared to what clinical self-management might consider as best practice. For some this was a strategic decision to focus on the collection of specific data, while for others, after an initial exploration of features, only a small subset was used regularly. Routine did not mean daily for all participants.

All Apps that the participants were using centred on objective monitoring activities (peak flow, glucose measurement + carbohydrates). Participants used these in a variety of ways. Sometimes the data led to quite specific criteria-based judgments for the day. For example, 'I will not take the tube, because my Peak Flow is < Z).' Participants also made judgments against trends at decision points, such as stopping a drug.

There was also a less decision-specific way of using the data in which participants made rough judgments about the state of their condition through a process of continual reflection against past data. For diabetes, this comparison involved reference targets (in line with clinical expectations of self-management). For Asthma, some participants expressed a looser sense of 'knowing what was normal for them'. When questioned further, none was able to give a technically correct explanation of the measures' meanings.

They had neither been given reference values by a clinician. Instead, they used phrases like 'that just lets me know I'm keeping on an even keel', 'that was just a bit of blip', 'you can see it's getting better all the time.'

One interpretation of this is that participants were deriving a broader meaning from the data about their overall condition rather than just using the data for day-to-day decision-making. It seemed that an important function of the data beyond decision-making was to provide some reassurance about their condition. This came through most clearly for those who had to manage and try to achieve control over an unpredictable condition. In one case, it seemed that having control over these numbers helped compensate for a wider sense of loss of control in a case where there were multiple unexplained medical issues and profoundly limiting disability. Yet, we also saw cases in which the process of collecting data was used to provide that sense of control rather than responding to the problematic numbers.

### *Clinical Interaction Data Usage*

While no participant started using an App as part of a clinical intervention, there were examples of data usage to mediate patient-clinician interactions. We found examples of both positive and negative interactions. To the positive end, patients brought, unprompted, data to their managing clinician to discuss treatment options. It was unclear whether the data was useful, but some participants gave a sense that this was one way to demonstrate being "a good patient."

In contrast, one participant used her data to argue with the clinician to take her condition more seriously. The clinician did not feel her symptoms were Asthma related, but she was able to demonstrate this through changes in her peakflow data. This contrast suggests that the use of data can play to the patient-clinician interaction in different ways, not necessarily intended by either policy makers who propose Apps as a mechanism of self-management or proponents that Apps can liberate people from the constraints of the clinical relationship [6,7].

### **Discussion**

The initial findings of this study suggest that there are at least some people who are managing to use an App to support their self-management strategy over time. However, we were surprised by the constrained nature of the interaction. We have termed it satisficing. There were limited attempts to find the 'best' app; feature use was minimal and often rationalized over time; and shortcomings overlooked.

Participants had developed some expertise in interpreting their data and conducting monitoring, but this was largely bounded by their initial choices and understanding of measures used in their condition. Behaviors for those with diabetes were more closely aligned to clinical expectations around glucose and carbohydrate, perhaps because of their proximate role in avoiding symptomatic hypo/hyper-glycaemia by choosing insulin dose. For asthma, however, there is a greater flexibility around medication taking to manage symptom experience: the scope for satisficing is probably greater. Perhaps most interestingly, there seemed to be multiple uses of the data. Not only were people using trend data for decision-making, but many

it seemed that the process was as important as the resulting numbers. Reflection on this finding suggests that there may be other motives for data collection, then direction management of symptoms.

We offer this initial analysis to raise questions about what we should be designing for in an App to support self-management. Is it enough to focus on convenient data collection and the trade-off of quality versus collection time? Or, do we need to consider more broadly the role of these Apps for both personal use and as part of the clinical encounter?

### **References**

1. Beyer, H. and Holtzblatt, K. *Contextual Design: Defining Customer-Centered Systems*. Morgan Kaufmann, San Francisco, 1998.
2. Burnay, E., Cruz-Correia, R., Jacinto, T., Sousa, A.S., and Fonseca, J. Challenges of a mobile application for asthma and allergic rhinitis patient enablement-interface and synchronization. *Telematics journal and e-health* 19, 1 (2013), 13–8.
3. Huckvale, K., Car, M., Morrison, C., and Car, J. Apps for asthma self-management: A systematic assessment of content and tools. *BMC medicine* 10, 1 (2012), 144.
4. Liu, W.-T., Huang, C.-D., Wang, C.-H., Lee, K.-Y., Lin, S.-M., and Kuo, H.-P. A mobile telephone-based interactive self-care system improves asthma control. *The European Respiratory Journal* 37, 2 (2011), 310–7.

5. Ryan, D., Price, D., Musgrave, S.D., et al. Clinical and cost effectiveness of mobile phone supported self monitoring of asthma: multicentre randomised controlled trial. *BMJ* 344, (2012), e1756.
6. GPs to 'Prescribe' Apps for Patients. Best Health Apps and Ideas to Revolutionise NHS for Patients. <http://mediacentre.dh.gov.uk/2012/02/22/>.
7. Quantified Self | Self Knowledge Through Numbers. <http://quantifiedself.com/>.