

Persuasive Technology And Mobile Health: A Systematic Review

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Abstract. Mobile Health (mHealth) is currently a topic of great interest worldwide. The major goal of most mHealth projects is to induce long-lasting behavior change among healthcare providers or patients or both. Clearly integration of Persuasive features has great potential for enhancing the effectiveness of mHealth solutions. In this paper we report the results of a systematic review of peer-reviewed papers describing mHealth interventions with a view to identifying the persuasive features employed, either explicitly or implicitly. Results have been summarized using descriptive statistics including cross-tabulations with types of mHealth interventions. Our results provide insights into the persuasive features that have been deemed to be useful across mHealth implementations in general and also across specific types of mHealth interventions.

Keywords: Persuasive Technology, Mobile Health, Captology, Pervasive computing, Behavior change, Technology Adoption, Smartphone, Cell phone, Tablet, PDA Smartphone.

1 Introduction

Mobile Health (mHealth) solutions, defined as the use of portable electronic devices such as cell phones, tablets, PDAs to support healthcare (Free, Phillips, & Felix, 2010), are generating great worldwide interest. Conferences like the mHealth summit in Washington D.C., which gathered more than 3200 attendees from 48 countries (mHealthSummit, 2011) and large scale projects such as the Project Masiluleke based on joint efforts from mobile operator MTN, handset manufacturer Nokia and National Geographic Society to launch a mass awareness campaign on HIV/AIDS, reaching over 350 million SMS per year, are current examples of such interest (Pop! Tech, 2010).

1.1 Mobile Healthcare - mHealth

The World Health Organization's Global Observatory for eHealth (GOe) defines mHealth or mobile health as "*medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices.*" (World Health Organization, 2011). This definition includes the use of multiple features like voice, short messaging service, general packet radio service, global positioning system and Bluetooth technology.

The portability of mobile devices provides numerous benefits while some limitations include reduced screen size, physical memory and processing capabilities, and power supply limited to a few hours (Kailas A, 2010).

1.2 Captology: Persuasion through technology

Fogg (2003) describes *Captology* as “*the study of user’s interactions with computers, focusing on the psychological drivers involved for pursuing an intended goal defined as change in people’s behaviors or attitudes without coercion or deception*” (Fogg B. , 2003). His work also describes three different roles of computers when interacting with individuals: *Tools*, *Media* and *Actors*. Each of these roles includes a different set of features that contribute to its persuasive effect when promoting behavior change. In addition Fogg (2003) describes a set of persuasive attributes specific to mobile devices. Clearly, the relationship between mHealth and persuasive technology is of great interest.

2 Related work

Riley Studied the relationship between behavior models and mobile interventions. (Riley, 2011). Similar work has been conducted such as a study describing the persuasiveness of six related alcohol-intervention websites (Oinas-Kukkonen, 2009). Chatterjee and Price (2009) provide a useful framework for the analysis of mHealth technologies.

3 Methods

Meta-search engines were used to ensure inclusion of major online libraries, including PubMed, EMBASE, HAM TMC. The search strategy included the following criteria: Out of the 13 categories defined by WHO for mHealth interventions, only those that were consumer-oriented were selected (*information initiatives, health survey and surveillance, mobile telemedicine, raising awareness, app reminders, treatment compliance, community mobilization and health promotion, health call center/telephone line*). Implementations only, with publication dates: 2007 to 2011.

4 Results

Major results of the systematic review are presented here in the form of tables and figures. Table 1a is a cross-tabulation of PPT attributes versus categories of mHealth and, finally, Table 1b is a similar cross-tabulation of mPT attributes.

mHealth Category	Primary Persuasive Technology (PPT) Attributes																	
	Reduction tunneling	Tailoring	Suggestion	Selfmonitoring	Surveillance	Conditioning	Cause and Effect	Virtual Rehearsal	Virtual Rewards	Simulations in RealWorld	Attractiveness	Psychological cues	Similarities	Praise	Reciprocity	Adoption of roles		
Unclassified			1%	3%		1%	1%									6%		
Health Promotion			3%	5%		1%	1%		3%	1%		1%	1%		3%	19%		
Health Survey						1%						1%	1%			4%		
Information Initiatives	3%		5%	1%		3%	1%	1%	1%						1%	17%		
Patient Monitoring	1%	1%	1%	4%	1%		1%		1%			4%	3%		3%	21%		
Raising Awareness	1%		4%													5%		
Treatment Compliance	4%	1%	4%	4%	1%	3%		1%	1%	1%	1%	1%	3%		3%	28%		
Total	9%	3%	0%	18%	17%	3%	9%	5%	3%	6%	3%	1%	6%	3%	6%	0%	9%	100%

Table 1a. Primary Persuasive Technology attributes per Mobile Health intervention Categories. Note that Suggestion in Information Initiatives is the most frequent persuasive feature found across all papers.

mHealth Category	Mobile Persuasion Technology (mPT) attributes													
	Timing	Convenience	Simplicity	Mobile Loyalty	Mobile Marriage	Information Quality	Social Facilitation	Social Comparison	Normative Influence	Social Learning	Competition	Cooperation	Recognition	TOTAL
Unclassified							1%			3%	1%			6%
Health Promotion		1%	4%				4%	3%	3%	3%	4%			23%
Health Survey									1%					1%
Information Initiatives	1%	3%	3%	1%	1%	3%			1%			1%		16%
Patient Monitoring	3%		4%	1%		1%	1%	1%	3%	1%	1%			19%
Raising Awareness	1%		1%							1%				4%
Treatment Compliance	3%	1%	1%			1%	4%	4%	3%	3%	3%	4%	1%	30%
Total	9%	6%	14%	3%	1%	6%	12%	9%	12%	12%	10%	6%	1%	100%

Table 1b. mPT attributes related to Mobile Health interventions. Note that simplicity and social facilitation, with normative influence and social learning represent most persuasive features of mobile health implementations.

5 Discussion

Very few papers reviewed included Persuasive Technologies studies during the conceptual design process (n=7). Most of the persuasive features listed are the result of unintended persuasive features included by only a small number of papers. Tables 1a and 1b show that all mHealth categories do not make use of all primary persuasive features. Thus there seems to be potential for increasing their effectiveness if more persuasive

features could be included. The persuasive feature of Computers as media was underused across all implementations. Cause and Effect (5%) and Simulations with Virtual Rehearsal (3%) were among the least used features.

6 Conclusion

mHealth applications that apply principles of persuasive technology could more easily achieve this potential. In this systematic review of peer-reviewed papers on mHealth interventions we have identified persuasive strategies that have been incorporated explicitly, or more often, implicitly, by the investigators. Our results provide insights into the current state of the art with respect to persuasion in mHealth and offer guidance to designers and developers of mHealth solutions.

7 References

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