

# Smartphones: Innovative Tools in Cancer Prevention



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## INTRODUCTION

This chapter explores the potential of smartphones on cancer prevention. The acceptability of mobile health (mhealth) technologies as promoters of behavior change and the identification of desired features necessary to prototype a cancer prevention app were assessed in a target population.

It is estimated that, by the year 2030, cancer will affect more than 26 million people worldwide and over 17 million will die from this disease (IARC, 2008; Jemal, Bray, Ferlay, Ward, & Forman, 2011). More than half of cancer cases are due to unhealthy behavioral options (Colditz & Wei, 2012); if everyone adopt a healthier lifestyle, cancer incidence would fall dramatically (Colditz & Wei, 2012; Colditz, Wolin, & Gehlert, 2012). Research has shown that there is a link between knowledge and the adoption of healthy behaviors (Hawkins, Berkowitz, & Peipins, 2010; Keeney, McKenna, Fleming, & McIlfatrick, 2010; Niederdeppe & Levy, 2007). Still, exceptions remain, being smokers the most paradigmatic example: despite all the warnings and campaigns designed to promote smoking cessation, many people continue to smoke (International Union Against Cancer, 2004). Information campaigns are needed to increase cancer awareness but they simply are not enough to promote behavior change.

## BACKGROUND

mHealth can be defined as all “medical and public health practice supported by mobile devices” (WHO, 2011, p. 6). mHealth solutions currently being developed could transform healthcare through patients’ empowerment (reflected in a higher quality of life), while increasing healthcare systems efficiency and sustainability (European Commission, 2014). Presently, mHealth is being applied in most areas of medicine and healthcare, having made important contributions to research on cardiology, diabetes, obesity, smoking cessation, elderly care, and chronic diseases (Silva, Rodrigues, de la Torre Díez, López-Coronado, & Saleem, 2015; Steinhubl, Muse, & Topol, 2015). mHealth interventions can be used globally to target specific behaviors and prevent major diseases. For instance, the “Be He@lthy Be Mobile”

DOI: 10.4018/978-1-4666-9978-6.ch081

initiative uses mobile phones to tackle non-communicable diseases with nationwide interventions (e.g. mTobaccoCessation in Costa Rica or mCervicalCancer in Zambia) (ITU, 2014). mHealth has already generated much public interest: by the end of 2010, mHealth applications counted more than 200 million downloads and about 70% of worldwide citizens were interested in at least one mhealth application. This has led to a rapid expansion of available mhealth applications (there are more than 400,000 available in the U.S. Apple App Store alone) (Silva et al., 2015). But problems have arisen concerning the security, reliability, and quality of service of these applications. Several studies have already pointed out the need to regulate these applications in order to prevent potential hazards (Steinhubl et al., 2015).

## **CANCER PREVENTION USING SMARTPHONES**

Population-wide measures targeting behaviors like inadequate sun exposure, smoking, excessive alcohol use, eating a poor diet, and physical inactivity could reduce overall cancer incidence in fifty per cent (Stein & Colditz, 2004). The European Code Against Cancer (Boyle et al., 2003) defines the following guidelines: (1) Do not smoke; (2) Avoid obesity; (3) Undertake some brisk physical activity every day; (4) Increase daily intake of vegetables and fruits (at least five servings per day); (5) Limit alcohol consumption to one or two drinks per day (women and men, respectively); (6) Avoid excessive sun exposure; (7) Enroll in cancer screening tests (cervical, breast and colorectal screening); (8) Participate in vaccination programs against hepatitis B virus and human papilloma virus; (9) Avoid exposure to known cancer-causing substances.

Individually, everyone should follow these cancer prevention guidelines to reduce their personal risk of cancer. But behavior change is a very hard task: people have generally favorable attitudes towards healthy behaviors, but they often lack the skills needed to maintain it as part of their daily routine (Kaptein, De Ruyter, Markopoulos, & Aarts, 2012). In many cases, cancer prevention involves changing several aspects of our lifestyles. Multiple behavior changes are difficult, but research suggests that it is possible. A study by Spring et al. (2012) showed that targeting diet and physical activity together seems to aid in the adoption and maintenance of healthy behaviors. It is argued that these two behaviors share physiological and behavioral mechanisms that, collectively, can impact energy balance, appetite and food choices (Mata et al., 2009). Physical activity is also recognized as a possible gateway to other health behavior changes (Kremers, De Bruijn, Schaalma, & Brug, 2004; Mata et al., 2009). By targeting multiple behaviors at once, one can promote a general sense of health that, in turn, might prompt other healthier behaviors with great benefits in the general health status.

According to Fogg (2009), behavioral changes occur when three elements converge in a given moment: motivation, ability and triggers. If one of these three elements is missing, change will not occur. This model clearly points out that motivation alone is not enough to induce a new behavior; the target behavior has to be simple enough to be performed by that person and a trigger has to be present to remind that person to perform that behavior (Stanford Persuasive Tech Lab, 2010). Fogg (2009) defines trigger as something that tells people to perform a behavior now. An effective trigger will remind and instigate people to perform the target behavior.

Fogg Behavior Model (Figure 1) predicts an action line that depends on the motivation and ability of individuals. This line determines whether a trigger will succeed or not. When a person is highly motivated to perform a behavior, a trigger might succeed even if the behavior is hard to do. When a behavior is easy to perform, even a person with low motivation will do it if prompted by the right trigger.

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