Chapter 4
Management of Obese Pediatric Patients in the Digital Era

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ABSTRACT
In this chapter, state of the art in mHealth solutions for monitoring and treatment of children suffering from obesity is presented and discussed. mHealth solutions are used for self-management, remote monitoring, and counseling of several chronic conditions including diabetes mellitus, heart failure, Parkinson’s disease, etc. Concerning childhood obesity, those solutions can combine targeted games and motivational approaches towards both physical activity and diet, which could help in addressing this serious and global health issue in the direction of minimizing co-morbidities and eventually preventing serious, life-threatening events. Management of obese children requires behavior change. Multi-component intervention programs via a mobile platform can play a significant role in weight control during childhood and adolescence. In continuation of the chapter, the authors report on the newest advances in the field of digital health interventions addressing childhood obesity.

INTRODUCTION
During 1990s, in association with the extensive use of the Internet, a variety of applications have been developed using e-technology. The introduction of e-Health promised to improve health care delivery and health care access through increased availability of information and enhanced communication. Although the word used is “health”, it refers to healthcare. There are several definitions for e-Health. Most of the definitions use technology: (i) as a tool to enable a process or improve function, and (ii) as effective means to enhance human activities (Oh, Rizo, Enkin, & Jadad, 2005). The most commonly used definition is

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that of (Eysenbach, 2001). mHealth is an abbreviation for mobile health, a term coined for the practice of medicine and public health interventions, using mobile devices. mHealth broadly encompasses the use of mobile telecommunications and multimedia technologies, within or along with conventional healthcare delivery systems. mHealth, today, is closely related to smartphones, which can provide connectivity to various devices and provide a means for receiving the feedback from the healthcare professional.

A definition formulated during the 2010 mHealth Summit for the Foundation of the National Institute of Health defines mHealth as “the delivery of health care services via mobile communication devices”. We could differentiate mHealth and eHealth by elaborating on their fundamental functions, as eHealth supports health systems while mHealth provides healthcare access. mHealth offers an unparalleled opportunity to reach individuals and implement changes. With mHealth applications, the individual is at the center and the most important link; the technology responds to an individual’s needs. Everything starts with the need of an individual, either a healthcare worker or a patient, in our case the patient, and the mobile technology application is viewed as the potential lever of the solution. Effective technologies are those that will undergo extensive modifications based on users’ needs. Patient groups that can benefit include, but are not limited, to patients with asthma, diabetes, obesity, heart failure, neurogenerative diseases, multiple sclerosis, malignancies and bipolar disorders. In this chapter, we will review and elaborate on the published experience regarding interventions using mobile technology targeting childhood obesity, as well as, on the future potential, benefits and limitations of this emerging technology.

Childhood obesity is considered by the WHO as a new epidemic and has been characterized as the number one health problem worldwide (Ng et al., 2014). The American Academy of Pediatrics guidelines target the reduction of total and abdominal obesity through increased physical activity and healthy nutrition (Pediatrics, 2011). Although, recent research has demonstrated the efficacy of these lifestyle changes on weight loss and weight maintenance as well as on the prevention of comorbidities, promotion and maintenance of such changes continues to be a challenge (Teixeira et al., 2015).

It appears that there is a significant and growing opportunity for eHealth obesity intervention designers to leverage the widespread public adoption of rapidly converging information and communication technologies—most notably the World Wide Web, wireless PDAs and cellular telephones (Tufano & Karras, 2005). Communication technologies such as smartphones offer a potentially powerful approach to support and maintain behavior changes, through delivering of convenient individually tailored, in line with the guidelines, behavioral interventions (Allen, Stephens, Dennison Himmelfarb, Stewart, & Hauck, 2013). There is research evidence suggesting that mobile phones provide a powerful tool for interventions seeking to improve and maintain health outcomes (Allen et al., 2013; Cole-Lewis & Kershaw, 2010; Krishna, Boren, & Balas, 2009). This is supported by a multitude of applications ranging from graphical outputs, diaries, games, motivational platforms, etc. and of course connectivity to social media. More importantly, the child in this framework, is placed at the center of the mHealth solution, but at the same time it is connected with other players who are involved in his/her healthcare activities, such as caregivers, mainly family, pediatrician, another medical doctor, the psychologist, the nutritionist, the hospital, the school, etc. By those means, there is hope and expectation that the positive effect can be maximal.

This article is a continuation of our previous chapter on mHealth solutions to pediatric obesity management (Vlachopapadopoulou & Fotiadis, 2016). Herein, the literature overview has been enhanced by analyzing and discussing the recent developments in the field. Emphasis is placed on mHealth interventions adopting a solid theoretical model of behavior change and combining electronic recording of diet, physical activity monitoring via wearable devices, personalized feedback, educational support and positive reinforcement.

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