

## Chapter 6

# A Framework of Childhood Obesity Prevention Through Game-Based Learning

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### **ABSTRACT**

*Childhood obesity is a global health issue that should be resolved in order to prevent obesity prolonged into adulthood. This chapter presents a framework of childhood obesity prevention through game-based learning among preschool children. A provisional framework was developed by adopting to the obesity treatment algorithm set by the National Institutes of Health. A mobile game titled Fight Obesity 2.0 was created to examine the validity of this provisional framework. The technical validity of the framework was checked through the International Age Rating Coalition, while the ecological validity was endorsed through interview conducted with pediatricians. The framework was revised based on the input of the validation processes. A set of guiding principles was prepared for medical professionals, game designers, preschool teachers, and parents who intend to use the revised framework of game-based childhood obesity prevention.*

DOI: 10.4018/978-1-5225-6026-5.ch006

## **INTRODUCTION**

Childhood obesity is a global health issue that should be resolved in order to prevent obesity prolonged into adulthood. Obese children commonly encounter difficulties in breathing (Niehoff, 2009), increased risk of hypertension (Raj, Sundaram, Paul, Deepa, & Kumar, 2007), early markers of cardiovascular disease (Aris et al., 2017), insulin resistance (Niehoff, 2009), and negative psychological effects (Rawana, Morgan, Nguyen, & Craig, 2010). As a result, childhood obesity is causing serious financial and mental pressure to a family and a society. In particular, preschool childhood obesity has been found by Sahoo et al. (2015) to be correlated to obesity in later years of childhood, thus preventing and treating preschool obesity are particularly important.

Sun, Schutz, and Maffei (2004) unfolded that unhealthy eating behaviors is the main reason why children became overweight or obese. In addition, Wareham, Van Sluijs, and Ekelund (2005) revealed that a low level of physical activity is the key factor that negatively affects the energy balance of human beings. This factor of childhood obesity is consistent with findings in other studies across three decades (Dietz & Gortmaker, 1985; Marshall et al., 2004; Hills, King, & Armstrong, 2007). In fact, these findings remained unchanged as Popkin et al. (2014) justified through a longitudinal study and claimed that shifts in physical activity and diet are two key factors of childhood obesity worldwide. In particular, Robert, Jeffrey, Margaret, and Kristy (1997) found that the risk of adult obesity was greater in both obese and non-obese children if at least one parent was overweight. Thus, the prevention of obesity should be acculturated in early years at home.

Among three main modalities of treating obesity, only the lifestyle intervention is the approved treatment modality for early year's children, as opposed to the medication and the bariatric surgery modalities (Uli, Sundararajan, & Vuttler, 2008). The lifestyle intervention can induce negative energy balance through diet, exercise, counselling, or a combination of these strategies. Through medical studies conducted in Ohio, USA, the lifestyle intervention has been proven to be effective for up to two years. Specifically, children aged five to twelve years old and children with overweight profit from lifestyle interventions.

Sbruzzi et al. (2013) proved that educational interventions are effective for treating childhood obesity. For instance, Gortmaker, Peterson, and Wiecha (1999) showed evidences that a two-year health education program called 'Planet Health' for middle school children was effective in increasing fruit and vegetable consumption among girls. In another program, Sallis, McKenzie, and Conway (2003) used environmental, policy and social interventions to increase physical activity and lower fat food choices. The results showed increased physical activity in boys. In terms of educational media, Frenn, Malin, and Brown (2005) deployed an Internet

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