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SYMPOSIUM

Integrative Gaming: A Framework for Sustainable Game-Based Diabetes Management

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Abstract

Obesity and diabetes have reached epidemic proportions in both developing and developed nations. While doctors and caregivers stress the importance of physical exercise in maintaining a healthy lifestyle, many people have difficulty subscribing to a healthy lifestyle. Virtual reality games offer a potentially exciting aid in accelerating and sustaining behavior change. However, care needs to be taken to develop sustainable models of employing games for the management of diabetes and obesity. In this article, we propose an integrative gaming paradigm designed to combine multiple activities involving physical exercises and cognitive skills through a game-based storyline. The persuasive story acts as a motivational binder that enables a user to perform multiple activities such as running, cycling, and problem solving. These activities guide a virtual character through different stages of the game. While performing the activities in the games, users wear sensors that can measure movement (accelerometers, gyrometers, magnetometers) and sense physiological measures (heart rate, pulse oximeter oxygen saturation). These measures drive the game and are stored and analyzed on a cloud computing platform. A prototype integrative gaming system is described and design considerations are discussed. The system is highly configurable and allows researchers to build games for the system with ease and drive the games with different types of activities. The capabilities of the system allow for engaging and motivating the user in the long term. Clinicians can employ the system to collect clinically relevant data in a seamless manner.

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Abbreviations: (app) application, (BDNF) brain-derived neurotrophic factor, (UDK) Unreal Development Toolkit, (VO_2 max) peak oxygen uptake

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