

# Promoting Lifestyle Change through Medical Avatars

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## INTRODUCTION

Unhealthy behaviors such as excessive alcohol consumption, tobacco use, overeating, and lack of physical activity place people at risk of serious health problems (Lessig, 1999). One or a combination of these behaviors may lead to debilitating chronic diseases like diabetes mellitus, hypertension, obesity, heart failure, coronary artery disease, and chronic obstructive lung disease among others (Lessig, 1999). These preventable health problems are increasing healthcare expenditures at an alarming rate worldwide. The 2012 WHO report placed the total global health expenditure at US \$6.5 trillion (WHO World Health Statistics Report, 2014). This rising cost of healthcare emphasizes the need for innovative personalized, patient-driven, yet cost effective health care that promotes positive lifestyle change.

At present when health risks are noted, they are generally addressed in a face-to-face healthcare professional encounter through counseling and motivational interviewing (MI), which may, or may not involve printed handouts. Evidence demonstrates that MI can be successful in getting individuals to modify their health behaviors (Martins & McNeil, 2009). However, this approach has not been uniform, consistent, or sustainable due to human resource constraints. Internet-based e-health programs, which work well for motivated or obligated learners (Friederichs et al., 2013), can overcome some of the challenges associated with face-to-face instruction (Schroeder & Adesope, 2013). However, these programs may not be effective when dealing with less motivated individuals. Embedding medical avatars (virtual humans) into these interactive e-health applications may make them more engaging, persuasive and effective at improving learner motivation (Baylor, 2011; Berkman & Breslow, 1986; Martin & Pear, 1992).

In this chapter, we defined medical avatars and presented theoretical frameworks that explain how medical avatars lead to health behavior change. We have presented empirical evidence from comparative studies, as well as neuroscientific evidence that support the use of medical avatars. We included data from our own research as well as other investigators in this growing field. We explored the technical challenges, and delivery systems such as mobile computing platforms. We end the chapter with future directions for research.

## BACKGROUND: INTERNET-BASED E-HEALTH PROGRAMS

Internet-based e-health programs, which work well for motivated learners, can overcome some of the cost, resource and access challenges associated with face-to-face instructions. However, these programs

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are less likely to be used or effect change when dealing with fully functional busy persons. E-health programs that improve knowledge, skills, and change behavior generally fall short when learners are not formally enrolled, motivated, and/or rewarded for their participation (Ahern, 2007; Eysenbach, 2005). Automated Internet interventions often report attrition of up to 80% with no follow up data collected (CHRISTENSEN, Griffiths, Mackinnon, & Brittliffe, 2006; Eysenbach, 2005). A systematic study conducted of Internet-based randomized controlled trials concluded that these trials typically experience high rates of loss to follow-up (Mathieu, McGeechan, Barratt, & Herbert, 2012). With such high attrition rates what we need is a more personalized, accessible, efficient, yet cost effective approach for patients to become confident and competent about their own health. Medical avatar technology promises to offer such an approach to enhance interactive online self-management programs.

## MEDICAL AVATARS

The word “Avatar” (*avatārah*) is a Sanskrit word for incarnation of a person or idea. In computing, an avatar is the digital representation of the user or the user’s alter ego or a character (Lessig, 1999). Medical avatars are digital representations of patients or professionals for health care purposes (Hettinger & Haas, 2003). Avatars, both human (anthropomorphic) and non-human, are already widespread in Internet environments that provide social networking, distance learning, teleconferencing or e-commerce. These digital agents have demonstrated the ability to facilitate engagement, communication, and social interactions in these virtual environments (Schroeder, 2002). Medical avatars offer patients an animated, personal, and more engaging encounter. The avatar addition to e-health applications introduces advantages in terms of better motivation and persuasion for behavior change. The addition of medical avatars within the context of online training creates an approach that merges the ease of access and lower long-term cost while engaging participants and sustaining their interest. Such an approach could evolve into an effective system for individualized personal training and an alternative for face-to-face health promotion interventions. A 2010 NIH workshop, “Virtual Reality Technologies for Research and Education in Obesity and Diabetes” (Ershow, Peterson, Riley, Rizzo & Wansink 2011), opened several avenues for discovering the potential of VR technologies for behavioral studies, and provided justification for their continued use to improve regimen adherence as well as nutrition, physical activity and other behavioral lifestyle changes associated with diabetes and obesity. Among the technologies most cited for further development is the personalized medical avatar interacting in an instructional or guiding manner to facilitate behavior change.

## THEORETICAL FRAMEWORKS

In learning environments, pedagogical avatars are animated life-like digital characters embedded in computer-based instructional systems that have the goal of facilitating social interaction and learning. The rationale for the use of pedagogical agents is their potential for social interaction that according to social cognitive learning theories may contribute to learning (A. L. Baylor, 2009). Interactive animated pedagogical avatars may become health coaches in health care environments. The appearance of the pedagogical avatar is an important consideration, because it may be a crucial factor in promoting social interaction.

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