

Improved mobility and reduced fall risk in older adults after five weeks of virtual reality training

Shirley R Shema¹, BPT,
Pablo Bezalel¹, MSc, Ziv Sberlo¹, BSc,
Orly Wachslar Yannai², MHA,
Nir Giladi^{1,3,4}, MD,
Jeffrey M Hausdorff^{1,4,5,6}, PhD,
and Anat Mirelman^{1,*}, PhD

¹Center for the study of Movement, Cognition, and Mobility (CMCM), Department of Neurology,

Tel Aviv Sourasky Medical Center, Tel Aviv, Israel

²Department of Physical Therapy, Tel Aviv Sourasky Medical Center, Tel Aviv, Israel

³Sackler Faculty of Medicine, Tel-Aviv University, Tel Aviv, Israel

⁴Sagol School of Neuroscience, Tel-Aviv University, Tel Aviv, Israel

⁵Department of Physical Therapy, Tel-Aviv University, Tel Aviv, Israel

⁶Harvard Medical School, Boston, Massachusetts, USA

Abstract

The aim of this analysis was to assess whether five weeks of training with virtual reality (VR) in a clinical setting can reduce the risk of falls in a variety of older adults. Thirty-four participants attending the VR clinic were studied. Participants underwent 15 training sessions consisting of walking on a treadmill with a VR simulation. Significant improvements were observed in gait speed, the Four Square Step Test and the Timed Up and Go. Treadmill training with VR appears to be an effective and practical clinical tool to improve mobility and reduce fall risk in older adults.

Keywords: Executive function, treadmill training, virtual reality, fall risk

Introduction

Normal and safe mobility depends on intact sensory and motor systems, but there is a growing body of research that specifically links the cognitive sub-domains of attention and executive function (EF) to gait alterations and fall risk (1, 2). EF apparently plays a critical role in the regulation of gait especially under challenging conditions where decisions need to be made in real-time and constant adaptation is required to manage internal and external factors (3). External factors can include, for example, obstacle crossing or attending to multiple tasks during walking. The performance during more demanding daily activities, such as walking while performing a simultaneous task (i.e., dual or multi task) or obstacle negotiation, plays a key role in the safety and well-being of a variety of individuals with either motor and cognitive dysfunctions (4, 5). Thus, interventions which focus on a combined motor-cognitive approach may improve gait and decrease the risk of falls.

Previous studies on the use of virtual reality (VR) for training of balance, gait and fall risk in older

* **Correspondence:** Anat Mirelman, PhD, Associate Director, Center for the Study of Movement, Cognition, and Mobility (CMCM), Department of Neurology, Tel Aviv Sourasky Medical Center, 6 Weizmann Street, IL-64239 Tel Aviv, Israel. E-mail: anatmi@tlvmc.gov.il