

Smart Aging platform for evaluating cognitive functions in the early phases of cognitive decline

Sara Bottiroli^{1,2}, Elena Cavallini³, Sara Bernini², Elena Sinforiani², Tomaso Vecchi^{3,2}, Cristina Tassorelli^{2,3}

¹Giustino Fortunato University, Benevento, Italy

²IRCCS Mondino Foundation, Pavia, Italy

³Dept of Brain and Behavioural Sciences, University of Pavia, Italy

Background: Serious games (SGs) based on Virtual Reality (VR) are innovative computer games designed for purposes other than pure leisure. SGs approach allows the evaluation of multiple cognitive aspects together with the many advantages that they offer in comparison to the traditional screening tests. Smart Aging in a SG platform for assessing cognitive functions which has been validated in normal aging (Bottiroli et al., 2017).

This study is aimed to evaluate whether performances in the Smart Aging platform varied according to the level of cognitive impairment and correlated with traditional screening tests.

Methods: We recruited 70 subjects at the “Mondino” Institute of Pavia. Twenty-one were healthy older adults (HC), 24 diagnosed with Mild Cognitive Impairment (MCI) and 25 with Early-Stage Alzheimer Disease (AD). They received a cognitive evaluation with the MMSE, the MoCA, and the Smart Aging platform. Smart aging required participants to perform 5 tasks closely related to daily life activities and evaluating different cognitive functions: executive functions, attention, memory, and visuo-spatial orientation.

Results: Smart Aging platform was sensitive to detect differences in cognitive performances among patients with different levels of cognitive impairment. In particular, patients among diagnostic groups performed significant differently in term of correctness in mostly of the Smart Aging tasks as well as in the global score. In addition, Smart Aging scores correlated with traditional screening tests.

Conclusions: The present study provides evidence that the Smart Aging platform can be used to perform large scale, low-cost screening campaigns of cognitive functions of the yielding to earlier detection of cognitive impairments and anticipated enrolment in rehabilitation programs. In conclusion, these findings demonstrate the validity of Smart Aging for assessing cognitive functions in the early phases of cognitive decline. Future studies will validate this platform also in other clinical populations.