

Chapter 83

New Technologies and Neuropsychological Evaluation of Older Adults: Issues and Challenges

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ABSTRACT

In this chapter the history of computerized cognitive testing for older adults is reviewed critically, challenges are being highlighted and solutions and emerging trends are discussed. Issues such as lack of validation, insufficiently documented psychometric properties and the high cost of computerized instruments are analyzed. At the same time a discussion concerning the lack of integration of computerized testing in healthcare highlights management issues and the need for a paradigm shift. Possible solutions to the issues presented and new avenues of research are identified. Emerging technologies such as adaptive testing, virtual reality (VR) environments, and reliable speech recognition software are presented and their potential is highlighted. At the same time social and scientific trends such as the shift to early detection and the increasing familiarity of older adults with technology are analyzed. The chapter concludes with an outline of the expected future of computerized testing.

INTRODUCTION

This chapter reflects on the relationship between technology and neuropsychological evaluation of older adults. A brief history of the use of technological instruments in this field is presented followed by issues concerning the use of computerized instruments in healthcare. Nowadays as dementia rates are rising and the global population is aging the need to use every available resource for helping older adults preserve

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their cognitive functioning is ever more pressing. Computerized cognitive testing has been present since the introduction of the first personal computers however it still remains a field that generates interest and often controversy. Research in this field is fast paced with no signs of slowing down. At the same time computerized testing is often viewed as a novelty. Its effectiveness is often questioned and despite its long history it hasn't been integrated in everyday clinical practice. The aim of this chapter is to provide an outlook of current issues in this field, highlight emerging technologies and trends and discuss possible solutions and avenues for future research.

BACKGROUND

As the world's population ages, issues concerning the cognitive health of older adults become ever more pressing. Dementia is becoming a major public health concern that exerts a heavy social and economic toll upon most societies. Worldwide there are 35.6 million people living with dementia and this number is expected to double by 2030 and triple by 2050. Prevalence of dementia ranges from 1% in persons under 65 years old up to 45% in persons over 85 years old. The global prevalence of dementia in people aged 60 and over is around 6%. Alzheimer's disease is the most common form of dementia accounting for 60 – 70% of dementia cases worldwide. Dementia is among the ten leading causes of death in high-income countries and one of the major causes of disability and dependency among older people worldwide. Globally it costs more than \$604 billion each year in medical and social care expenses and loss of income of patients and caregivers, a figure that represents 1% of the worldwide gross domestic product (World Health Organization, 2012).

The global effort against dementia and cognitive disorders in general focuses on early diagnosis. On average a new case of dementia is detected every four seconds however dementia remains largely under-diagnosed even in high-income countries as less than half of dementia cases are routinely recognized. Usually diagnosis comes at an advanced stage of the disease thus limiting treatment options. Diagnosis in primary care is difficult as general practitioners and family doctors often lack the necessary specialized knowledge (Waldemar, et al., 2007) while referrals for specialized neuropsychological testing are costly and time consuming.

Computerized cognitive testing has been proposed as a means to aid diagnosis and facilitate record keeping thus enabling health services to deal with the ever increasing number of older adults that have to be screened for dementia. It offers distinct advantages compared to traditional pencil and paper tests such as savings of costs and time, accurate recording of responses and the ability to automatically store and compare a person's performance between testing sessions. Test administration is standardized and unaffected by examiner bias while computerized tests can often be administered by personnel with limited training such as nurses and health care associates. Furthermore many computerized instruments offer alternate batteries for brief screening or for assessing specific cognitive functions. A number of these tests allow the clinician to create custom batteries in order to deal with specific situations and clinical needs. Finally some tests can adapt to the examinee's level of performance enabling them to cover a wide range of cognitive ability while minimizing floor and ceiling effects (Zygouris & Tsolaki, 2014).

The relationship between neuropsychology and technology dates back to the introduction of the first personal computers. Neuropsychologists and test designers have always monitored technological progress and were quick to implement new technologies in neuropsychological testing and evaluation (Zygouris

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