Can Video Games Benefit the Cognitive Abilities of the Elderly Population?

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INTRODUCTION

Human aging is more than a mere process of physical changes, because it encompasses a complex interaction of many biological, cognitive, emotional, relational and social factors. An aging population is exposed to a greater vulnerability due to biopsychosocial losses that may be associated with the aging process of the individual. At the physiological level, all body systems may reflect the aging of its organs, including the nervous system. This process may include changes in the neurotransmitters, brain atrophy, cellular changes, decreased oxygenation and changes in blood flow in the brain, among others (Guerreiro, 2005). At the sociological level, the social losses that most commonly are due to aging involve the loss of significant others, loss of social support and loss of power. Several studies conclude that social support levels decrease with age, and there are also decreases in contacts with friends, in satisfaction with the support received and in anticipated support (Shaw, Krause, Liang, & Bennett, 2007). At the psychological level, there is plenty of evidence of cognitive decline associated with aging (Albert & Killiany, 2001). It is at this level that the present work will place more emphasis, trying to demonstrate the importance of using video games by the elderly population, including the benefits that may be involved. The preservation and recovery of cognitive functions and physical, psychological and social autonomy are attained through mental and physical activities with a new vision. Like other activities, the use of video games have shown benefits for this population, namely at the cognitive level.

This work aims to show the importance of the use of video games by the elderly population, that is, to show that video games can be used as a protective factor in cognitive decline. We will perform a review of some of the research conducted in this area and present the main conclusions.

BACKGROUND

Cognitive Aging

The aging population is one of the greatest triumphs of humanity and also one of our greatest challenges. The elderly are often ignored when, in fact, constitute an important resource for the structure of our societies. Worldwide, the proportion of people aged 60 and over is growing faster than any other age group. Between 1970 and 2025, a growth of 223% (694 million) is expected in the number of older people. By 2025, there will be a total of approximately 1.2 billion people over 60 years. By 2050 there will be two billion, of which, 80% in developing countries. Research shows that cognitive abilities reach their peak by the age of 30 years, continuing stable until the age of 50/60 years, and begins to diminish from this point on, with the decline accelerating from 70 years onward (World Health Organization, 2005).

Cognitive abilities that are most impaired in elderly people are perceptual speed, memory, visual-perceptual and motor functions, inductive reasoning and verbal and numerical skills. Some protection factors of age-related cognitive decline have been identified that can be summarized by "intelligence workout" (Barreto, 1984).

The recovery of cognitive functions is possible through the recurrent practice of "intelligence workout" as is advocated by several studies that concluded that cognitive training can lead to a recovery of the functions concerned (Schaie, 1994). This makes sense

if we think about neuronal plasticity and cognitive reserve. In terms of the neuronal plasticity (the brain's ability to compensate for losses), it seems to remain throughout life, albeit diminished at older ages (Mahncke, Bronstone, & Merzenich, 2006). With regard to cognitive reserve (resilience to brain damage), it can be increased by stimulation, in order to reduce the clinical manifestations of deteriorated areas (Franco-Martín & Villameriel-Orihuela, 2006). Barreto (2007) reported that cognitive stimulation can reverse situations of normal or pathological cognitive decline through the use of the cognitive reserve that we possess.

Preservation and recovery measures of intellectual skills are the more important the more we know the consequences of its deterioration. Among the consequences of this deterioration, we find the effects of cognitive dysfunctions and the consequent implications on mental and physical health (Ghisletta, McArdle, & Lindenberger, 2006). The importance of involvement in activities (physical, mental and social) in the preservation and restoration of a good functioning in the elderly is consensual (Barreto, 2007; Vaz-Serra, 2006; Guerreiro, 2005; Zimmerman, 2000).

Among the forms of protection and overcoming of cognitive decline related to cultural and leisure activities, we can enumerate physical exercise (Weuve, Kang, Manson, Breteler, Ware, & Grodstein, 2004), playing Bingo (Sobel, 2001), carry out common cognitively stimulating activities like watching television, listen to radio, read newspapers/magazines/books, play card games, checkers, crosswords, among others (Wilson, Li, Bienias, & Bennett 2006).

One can not deny that there is plenty evidence about the cognitive decline associated with aging, more specifically, at the level of explicit memory, executive functions and language (Albert & Killiany, 2001). Junqué and Barroso (2001) highlight memory, perceptual speed, motor functions and visual-perceptual functions as the most affected cognitive functions by aging. Hooren, Valentijn, Bosma, Ponds, Boxtel and Jolles (2007) draw similar conclusions, highlighting verbal memory, processing speed, executive functions and verbal fluency.

Barreto (1984, 2007) argues that "intelligence workout" is a condition for its preservation. This idea is consistent with Schaie (1996) which concluded that cognitive decline in old age is due to the result of lack of use of cognitive abilities. Cognitive ability depends on the processes of representation (crystallized intelligence) and control (fluid intelligence), as well as the interaction of these two processes (Craik & Bialystok, 2006). Thus, with the contributions of these authors, crystallized intelligence and fluid intelligence gain greater specificity because the former includes the representation itself, the exercise of acquired knowledge and the ability to access it, and the latter presents different paths dependent on the corresponding areas of the brain (the ones corresponding to the frontal lobes are more easily subject to decline with aging, such as planning, decision making, conflict resolution and executive functions).

There are some elderly people who seek medical help for complaints related to cognitive decline, without meeting the criteria for a diagnosis of dementia (Marques, Firmino, & Ferreira, 2006). Therefore, these elderly people are considered to belong to an intermediate group, between the group of elderly people who age without major problems (although they may present cognitive decline related exclusively with aging) and the group of those with a diagnosis of dementia.

The word dementia derives from Latin (*dementia*) and means the loss of mental faculties. "When we speak about dementia we have a particular attention to a set of changes affecting the cognitive domain, but sooner or later, other domains of mental life are affected, and the functioning of the organism as a whole turns out to be also affected" (Barreto, 2007). Marques, Firmino and Ferreira (2006) characterize dementia through the presence of acquired deficits, persistent and progressive in multiple cognitive domains that determine, though without compromising the level of consciousness, a deterioration of intellectual faculties sufficiently severe to affect social and/or professional competences of the subject.

The concept of mild cognitive impairment (MCI) was originally used by Reisberg, to designate a very slight cognitive defect with also a very slight repercussion on functionality, i.e., it does not affect the basic tasks of everyday life, but can affect more complex tasks (Ribeiro, Guerreiro, & Mendonça, 2006). According to these authors, the most publicized criteria for the diagnosis of the most common subtype of MCI (amnestic) are the following: memory complaints (if possible confirmed by a companion), shortcomings in memory tests (in relation to age and education), normal global cognitive function, maintenance of activities of daily living and an absence of dementia.

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