Ageing Positively with Digital Games

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Abstract. Active ageing is the process of optimizing health, social participation and security in order to enhance the quality of life of older individuals. Building on the paradigm of Positive Technology, we argue that new advanced technologies may offer interesting solutions to enhance well-being in the elderly. Specifically, digital games deserve a special attention because recent studies show that the elderly are receptive towards the adoption of digital games and the number of older gamers is increasing. In the present contribution, we review the potential of digital games in enhancing positive emotions, engagement and social connectedness, and outline future challenges for research and guidelines for game designers interested in this peculiar field.

Keywords: Active ageing · Positive technology · Video games · Positive emotions · Engagement · Positive gaming

1 Introduction

It is well-known that one of the defining features of our society is that it is an "ageing society". By 2050, the ageing population (aged 65 and over) is projected to increase to 1.25 billion, accounting for 22% of the entire world's population [1]. Although the dramatic increase in life expectancy poses several critical challenges for health-care systems, since age-related diseases will consequently result in a dramatic increase in the use and costs of health services, there is a significant number of elderly individuals who wish to remain physically and cognitively healthy.

This shift in the definition of the ageing led institutions such as the World Health Organization to introduce concepts such as the so-called "active ageing" [2, 3], which may be defined as the process of optimizing health, social participation and security in order to enhance the quality of life of older individuals. Specifying the initial framework proposed by the World Health Organization [2], Walker [4, 5] explained the principles for building a strategy for structuring successful actions for active ageing and assigned a key role for well-being. Specifically, Walker [4, 5] emphasized that the "first principle" for all active ageing strategies should be the enhancement of individual and social well-being. It is interesting to note the also in considering elderly individuals,

health is no more merely considered as the "absence of disease", but it is began to be conceived in a more holistic way, integrating also the social, cultural and psychological aspects. Indeed, the relationship between well-being and ageing is triggering considerable attention [6]. As recently highlighted by Steptoe and co-workers [6] in their Lancet paper: "As life expectancy increases and treatments for life-threatening disease become more effective, the issue of maintaining wellbeing at advanced ages is growing in importance" (p. 604).

The question is how to effectively promote well-being for an active and healthy ageing society. The incredible development of new advanced technologies may offer interesting solutions so that the full potential of active ageing will be achieved. In this direction, over the past decade, new disciplines have been developed for specifically exploiting the potentiality of technology for the elderly, such as the "gerontechnology", which refers to the "study of technology for ensuring good health, full social participation, and independent living throughout the entire life span" [7]. However, a theoretical perspective which may specifically guide the technological development emphasizing the promotion of well-being is that of Positive Technology [8–10]. Built on the conceptual framework of Positive Psychology [11–13], which can be defined as the scientific investigation of well-being to understand how exploiting human strengths and virtues to allow individuals, communities and societies to flourish, Positive Technology appears to be a promising approach to develop advanced technologies for both physical and mental health. More specifically, following the classification proposed by Seligman in analyzing the construct of well-being [14], it is possible to classify three different types of "positive technologies" [8–10] according to their roles in promoting different layers of well-being: (i) hedonic positive technologies: the use of advanced technologies to enhance positive emotions and to support enjoyable experiences ("the pleasant life"); (ii) eudaimonic positive technologies: the use of advanced technologies to support enriching, meaningful and self-actualizing experiences ("the engaged life"); and (iii) social/interpersonal positive technologies: the use of advanced technologies to connect individuals and groups improving social integration ("the meaningful life").

2 How to Promote Well-Being in Elderly: The Role of Positive Gaming

Focusing our attention on what Seligman called the "pleasant life" [14] (i.e., achieved through the continuous experiencing of pleasant experiences) which corresponds to the hedonic well-being [13], a growing body of evidence showed how positive emotions can play a crucial role in active and healthy ageing [15–18]. The application of advanced positive hedonic technologies may yield to more promising results since from the earliest stage of the recovery, focusing on the specific characteristics of different elderly individuals and specifically intended to promote well-being in terms of engaging pleasant experiences [19, 20].

A first prototype to enhance hedonic well-being of elderly individuals from the earliest stage of the recovery is given by Ohsuga and co-workers [21, 22], who developed the "Bedside Wellness System". The idea was to develop a system capable

of reduce discomfort of elderly individuals caused by long period in bed by reproducing the sensation of walking immersed in enjoyable virtual reality environments (i.e., virtual forest).

A more recent and structured example on how to induce positive emotions using advanced technology for the elderly is offered by Banos and her co-workers [23]. They developed and tested two virtual environments as a part of the Butler System [24], i.e. an e-health platform designed to deliver health care to the elderly exploiting the potential of technology (mood monitoring and induction procedures, memory training, forum and chat, etc.). To specifically induce relaxation and joy, these two virtual environments reproduced a pleasant green park with a lake. Elderly participants were invited to freely navigate within them, recall positive autobiographical memories and learn mindfulness skills. For evaluating the efficacy of these two virtual environments in inducing positive affective states, 18 elderly individuals were asked to explore their interactive features in two different sessions. Findings showed a significant increase in relaxation and joy and a parallel significant decrease in anxiety and sadness [23].

Overall, these results confirmed the role of positive advanced technology, and in particular virtual reality, in promoting positive affect states and hence enhancing hedonic well-being for healthy elderly.

The situation appears still more promising if we consider the steady increase of older adults playing games between 2004 and 2011 (Entertainment Software Association, ESA [25]). In fact, among several leisure activities there are some that encourage mastery and achievement and provide an opportunity for people to develop and improve skills as well as achieving satisfaction and a sense of accomplishment [26]. This is the case of playing chess, learning a foreign language, playing a musical instrument and enjoy computer games. Recent studies have shown that the elderly are generally receptive towards the adoption of digital games [27] and that their attitudes become even more positive after computer game experiences showing the potential to positively affect their mental well-being [28]. Nap et al. [29] conducted two focus groups and a contextual inquiry with elderly to investigate seniors' motivation to play digital games and concluded that some of the main motivations to play games were fun and relaxation. Considering the elderly acceptance of technology and their availability of leisure time, the ageing population represents an important target that has to be considered by innovators and game designers, comparable if not better than younger consumers.

More than twenty years ago, Whitcomb [30] found that although only a limited number of games had been investigated at that time, it was possible to identify a range of benefits for older people from playing computer games. These included the recreational pleasures of satisfaction and accomplishment which positively influenced people's view of themselves and their abilities. More recently, Ijsselsteijn, Nap, de Kort and Poels [31] identified four potential areas in which games can enhance quality of life for older people. First, and perhaps most basically, is the use of digital games for relaxation and entertainment. Allaire and colleagues [32] recently compared Regular, Occasional, and non-gaming older adults and suggested that older adults who reported playing digital games score, on average, significantly better than non-digital game playing on measures assessing a number of domains of successful aging. Specifically, older adults who were classified as Regular and Occasional Gamers reported less

depression and lower negative affect as well as higher well-being than their non-gaming counterparts. Importantly, the authors found also no significant differences among groups for positive affect, social functioning, and self-reported health. One possibility for these findings is that digital games serve as a source of entertainment which may lower negative affect and depression and increase well-being. Thus, gaming technology has significant potential to contribute positively to seniors' leisure time and to propose significant alternative to other well-established daily habits such as watching television.

Secondly, many elderly enjoy games as a means of socializing with others within and outside their social network. Digital gaming has become an increasingly social activity that provides a rich set of enjoyable topics of conversation, as well as a common activity that can serve as a way of decreasing social distance. For example, Al Mahmuda and colleagues [33] introduced the mobile phone game "Walk to Win" which aimed to encourage social engagement among the elderly. This is also the case of intergenerational programs that elderly people particularly appreciate [34]. This is related to a recent social trend involving games embedded in online social networks in particular [35]. Indeed, young gamers often invite their elderly relatives to play because of utilitarian reasons (e.g. gaining game resources thanks to multiple in-game friends visits). But then, the shared experience of the game provides new conversation material, fill the geographical distance, and constitutes a new affordance for relationship building. Recent studies showed that the interaction with the children's youth and enthusiasm functions as a source of emotional well-being for the elderly [36] sharing in the context of intergenerational gaming does foster connections and produce positive emotions for both generations [37]. Furthermore, elderly showed more positive attitudes toward younger people and increase life satisfaction [38].

Third, games can be played with the explicit motivation of sharpening one's mind. This area includes challenging mental activities, such as puzzles and quizzes, aimed to stimulate cognitive abilities such as memory and attention. Also recent randomized controlled trials demonstrated that video games designed to improve mental abilities, such as the so-called "brain training" games, can effectively improve cognitive abilities in the elderly [39]. The last area is represented by the possibilities of interacting that thanks to new technologies are both more natural in terms of affordances and engage the whole body. Keyani and colleagues [40] created the digital game "Dance Along" with the goal to promote social engagement combining exercises, dance and digital gaming for older people. The Sony EyeToy (using computer vision) and the Nintendo Wii (using position and acceleration sensing) are examples that allow for an embodied, physically active way of engaging with the game content. In such a context, digital games can be regarded as persuasive technologies that provide an additional incentive to engage in healthy behavior by engaging the user in a virtual fitness program, providing guidance and coaching that can be tailored to the individual [41].

What makes gaming a source of well-being? When performing a well-learned procedural activity people feel the experience of flow and engagement. Such experiences are intrinsically rewarding and positive, to the point they are commonly listed as reasons for approaching video games [42]. Flow can be defined as a positive experiential state occurring when the performer is totally connected to the performance, in a situation of balance between perceived personal skills and required challenges [43].

The experience of immersion in an activity reach a so intense level that one feels a sense of satisfaction and loses track of time. Essentially, flow can be seen as defining the conditions for positive, meaningful experience, and playing computer games provides an example of how this can be achieved using technology (e.g., [44, 45]) also with elderly population [46, 47]. This will open the chance to develop a new class of positive applications that may enhance well-being for the elderly not only by inducing positive emotions, but also by providing engaging, self-actualizing and social experiences.

3   How to Design Future Positive Technologies for Elderly? Future Challenges

There is a call from the research community for formulating digital games to meet the wellbeing and entertainment needs of elderly people. Although this area is growing, multi-user virtual environments and digital games have not yet been fully explored as potential positive technologies that can be utilized as a support tool in improving the affective state the older people. To reach this goal is important to recognize the need for specialized training and continuous support for the elderly who need to feel self-efficacy in using digital technologies and virtual worlds/games. A good design represents a strategic role to increase the degree to which a specific group of users are able to play a game and effectively accomplish tasks. Several aspect ranging from display selection, fonts, screen element organization, navigational elements, easiness of interaction, as well as rules and tutorials all play an important role in ensuring that games match the specific needs of the elderly, and ensure that the game environment is user-friendly, useful, simple and motivating [48, 49]. The elderly are frequently *"casual"* gamers [50], so that they prefer games with simple and positive narratives; thus gameplay should be adequately challenging but not devoted to the increasing of difficulty, and limited in time to allow players to have fun without excessive time investments.

To conclude, it is possible to identify digital game characteristics that may help in providing positive experiences to older gamers. As first, video games can feature pleasant environments and exploratory activities that foster relaxation and positive emotions. Secondly, game activities designed basing on measures of the players' ability may promote optimal experiences and engagement. Finally, game designers should exploit ways to enhance social aspects of gameplay, such as embedding the games within already-existing online social networks, in order to allow the gamers to experience new opportunities for social connectedness.

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