# Silver Gaming: Serious Fun for Seniors?

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**Abstract.** This exploratory qualitative study provides insight into the role that exergames play for seniors. 15 participants (aged 53–78) engaged in playing Your Shape Fitness Evolved 2 on the Xbox 360 Kinect, after which we conducted a semi-structured interview with each participant. We found that in all cases, the innate psychological needs of autonomy and competence (Self Determination Theory) were met. Playing the exergame served not only as a therapeutic instrument with a capability to exert a positive effect on physical and social wellbeing, it also brought entertainment, providing excitement and fun.

**Keywords:** Exergames · Digital games · Older adults · Seniors · Meaningful play · Self-Determination Theory (SDT) · Autonomy · Competence

## 1 Introduction

Aging and digitalization are important trends in the Netherlands. Moreover, the number of Dutch seniors who make use of digital media is growing swiftly [1]. As people age, their risk of developing health problems also increases. Exercise is one of the ways people can stay healthier longer. In recent years, silver games have emerged as an instrument to stimulate seniors to exercise regularly [2]. Exergames in particular are viewed as an effective means of doing so, as these games focus on physical exercise, with the players performing movements that they see on a screen, and thus being given direct digital feedback [3, 4].

According to Huizinga [5], games are a fundamental aspect of life. In 1938, he observed that, next to *homo faber* (man the maker), there is also the concept of *homo ludens* (man the player). Bogost [6] comments that these days, we have become as used to playing digital games in the living room as watching television (see also [7–10] on the role of ICT in our daily life and Juul [11] on the casualness of video games for our lives). An increasing number of people are familiar with digital games that are played "for fun". [12] However, there are also digital games that serve to convey a "serious" message to the player. These are known as serious games. Wiemeyer and Kliem [13] clarify this as follows: 'The idea of "serious games" is to integrate playing games, simulation and learning or training for serious purposes like education, exercising, health, prevention, rehabilitation and advertisement' (p. 41).

Research has shown that playing exergames can benefit the health of young people, and thus form a valuable therapeutic instrument [14–16]. Other studies show that seniors are extremely interested in traditional games that can be deployed as a

therapeutic instrument, and that their health appears to benefit also from playing digital games [4, 17–20]. But are games of this type so attractive to seniors that they actually want to play them? International research into the motivation of seniors for playing digital games reveals that physical and social well-being are important factors in this respect [21–23]. Far less is known about the way Dutch seniors give meaning to digital games. An exception is a study conducted by Nap et al. [24], which shows that fun and relaxation are the main reasons for seniors to engage in digital games, while according to the Dutch white paper Let's play [25], social interaction is the main motivation. Health considerations make it essential to gain more insight into the motivation for Dutch seniors to play, or not to play, exergames. To that end, we conducted an exploratory qualitative study with semi-structured interviews with fifteen Dutch seniors, who we recruited to play the Xbox 360 Kinect's exergame Your Shape Fitness Evolved 2.

## 2   Self-Determination Theory

We used Self-Determination Theory (SDT) [26–28] for our study into seniors' motivation for playing an exergame. Ryan and Deci define motivation as follows: 'To be motivated means to be moved to do something' (p. 54) [28]. SDT distinguishes between intrinsic motivation (doing something because it is inherently interesting and provides enjoyment) and extrinsic motivation (doing something because it leads to a specific result) (p 55) [27]. SDT addresses the three innate psychological needs of autonomy, competence and relatedness. These needs affect motivation and well-being within domains such as sports and health care [27]. Using SDT, insight can be gained into what moves seniors to play exergames.

From a study conducted among students, Peng et al. [29] concluded that an exergame incorporating gaming elements that support the innate psychological needs of autonomy and competence increase the motivation to play this game. They did not study the third basic need supported by SDT, i.e., relatedness, as this played no role in the exergame examined by Peng et al. [29]. Our research further elaborates this study and likewise focuses on the psychological basic needs of autonomy and competence. However, where students with an average age of 21 served as the target group for the exergame studied by Peng et al. [29], in our research [30], we opted to study seniors (aged 53–78) playing an exergame.

### 2.1   Autonomy

Ryan et al. [31] define autonomy as self-regulation – a person's ability to perform a particular task of his or her own volition. Related to the play of a digital game, the voluntary choice to play such as game, as well as by factors in the game (e.g., the extent of freedom in choosing the order in which to perform tasks, the freedom to choose specific goals), and the rewards provided for feedback purposes, or to control the player's behavior play an important role.

## 2.2   Competence

Competence, according to Ryan et al. [31] is reflected in the need of people to be able to act in such a way that a desired outcome is reached. Hence they state that competence is expressed in the need to seek out challenges and in the feeling of being able to act effectively. In digital games, it is important that players are able to master the game easily and intuitively, that the tasks in the game offer optimum challenges and provide opportunities for positive feedback.

## 3   Method

We have taken the measurement instrument 'Player Experience of Need Satisfaction' (PENS) developed by Ryan et al. [31] on the basis of the SDT and the results of Peng et al. [29] as the starting point for the topic list of our study (see also Sect. 3.3 and the Appendix), based on research conducted by Zonneveld for her Master thesis [30].

The results of the study conducted by Peng et al. [29] showed that the innate psychological needs of autonomy and competence influenced the following factors: (1) game enjoyment, (2) motivation for future play, (3) likelihood of game recommendation, (4) self-efficacy for exercise using the game, (5) game rating.

Our exploratory study is qualitative in nature. This means that we attempted to recognize trends on the basis of semi-structured interviews. Hence, the aim was not to look for significant generalizable results. This study could serve as a pilot for an eventual large-scale follow-up study, in which the trends emerging from this study can be tested in the light of hypotheses.

## 3.1   Participants

Fifteen Dutch seniors participated in the study, eight of whom were members of the ANBO, The Netherlands' largest organization representing the interests of seniors (four women and four men aged 55 to 78) and seven seniors from our personal network (three men and four women aged 53 to 74). The mean age of the participants was 65.3. Eight participants were research university graduates, five had attended a university of applied sciences, one participant had completed senior secondary vocational education and training and another participant had completed the Dutch MAVO general secondary education program. Of the fifteen participants, four worked and eleven had retired. Two participants in total already played exergames on a regular basis, while the other thirteen were as yet unfamiliar with these. A few participants indicated that at the most, they had seen their grandchildren playing exergames. Three of these thirteen participants indicated that they played digital games, such as solitaire and mahjong; the other ten participants had no experience at all with digital games.

To take part in the study, two criteria had to be met. First, the participants had to be aged 50 or more, the age limit for the Silver Generation used by Jäger and Weiniger in their study [2]. In the second place, the participants needed to have good balance and be able to engage in physical activity without the use of an assistive device. This criterion was explained during the telephone call or in the email in which the initial contact was

made. Moreover, their balance was tested prior to playing the exergame by means of the Timed-Get-Up-and-Go-Test (TGUGT) used by physical therapists [32]. The participants had to stand up from a chair, walk three meters to the wall, turn around without touching the wall, walk back and sit down again. This was repeated three times; the participants were timed with a stopwatch and the average time was calculated from these three measurements. The TGUGT distinguishes three categories with regard to balance: normal, frail seniors and further evaluation required. To participate in our study, participants had to belong to the first category (normal), so that they would not be at risk of falling while playing the exergame. This meant that they had to complete the test with an average score of less than ten seconds. The exergame was required to be played while standing, which meant that it was important for these seniors to have good balance. Of the fifteen participants who participated in this study, the average score for performing the TGUGT was 6.5 s. The fastest average time was 4.8 s, achieved by a 53-year-old man, and the slowest (average) time was 8.5 s, scored by a 66-year-old woman. Next to performing the TGUGT, the participants also delivered background details, such personal data (male/female, age, highest level of education completed), use of PC/Laptop/IPad or other tablet/Smartphone, use of games, physical activity.

In total, an hour and a half was reserved per person for semi-structured interviews based on a topic list prior to the gaming session, the gaming session itself and the topics after the session (see also Sect. 3.3 and the Appendix).

## 3.2 Game Session

For this study, we used an Xbox 360 Kinect game computer to play the exergame Your Shape Fitness Evolved 2. The spoken language of the game in question is English, with subtitles in Dutch. The game was entirely controlled by the movements of the player. The Kinect cameras and sensors registered these movements, determined the location and position of the player, analyzed the movements, communicated this information to the game, and provided direct feedback to the player. Thus the player, standing a few meters from the screen, was able to control the game with hand movements (Fig. 1). Using hand movements, players could select menus on the screen or scroll through the main menu. The game offered familiar activities, such as walking, playing soccer, yoga and tai chi. In the main menu of this exergame, a distinction was made between various menus. As the participants were seniors, games were selected from the activities and classes menus. We deliberately decided not to choose any games from the workout menu, as the pace of these was too high and many of the exercises had to be performed standing on one leg, which could lead to balance problems.

## 3.3 Interviews After the Game Session Had Ended

After the game session, a semi-structured interview was conducted, which included topics relating to autonomy and competence.

**Fig. 1.** Senior playing the exergame

Autonomy was divided into internal and external autonomy. Internal autonomy referred to the participant's feeling of being able to make his or her own choices while playing an exergame. External autonomy dealt with the voluntary performance of tasks, without any feeling of pressure, in order to play the game.

Competence was divided into two aspects: playing the game and dealing with the game interface.

To reach our aim that the participants' answers concerning the two innate psychological needs of autonomy and competence might offer insight into the degree of motivation for playing an exergame we conducted our semi-structured interviews on the basis of the following clusters of topics (see also the start of Sect. 3):

(1) game enjoyment – based on the 'Enjoyment Scale' developed by Song et al. [33]
(2) motivation for future play – based on Ryan et al. [31]
(3) likelihood of game recommendation – by means of the question of how likely they were to recommend others to try playing the game, based on Peng et al. [29]
(4) self-efficacy for exercise using the game – derived from the General Exercise Self-Efficacy Scale developed by Shin et al. [34]
(5) game rating – the participants ranked their ultimate level of enjoyment derived from playing the game by assigning a number from 1 to 10, where 10 indicates the highest level of enjoyment.

# 4   Results

## 4.1   Autonomy

As explained in Sect. 2.1, Ryan et al. [31] define autonomy as self-regulation – a person's ability to perform a particular task (such as playing a digital game) of his or her own volition. Autonomy was divided into internal and external autonomy (see also Sect. 3.3).

The semi-structured interviews revealed that none of the fifteen participants experienced pressure from the game to play this in a certain way: there was a sense of internal autonomy. Six of the fifteen participants stated explicitly that they felt they had experienced ample freedom of choice because of the extensive range of games and the different levels available. Also, six participants mentioned that the game determined how it was to be played, but that they had not experienced this as pressure. These participants saw this as a positive aspect, as it contributed to achieving a particular goal: 'I experienced no pressure while playing, at the most a challenge because it's fun to play and because you're striving to achieve something and you see the scores rising, so that provides the challenge.' Participant 4.

The semi-structured interviews also showed that of the fifteen participants, eight expected to experience no external pressure at all to play the game. They have a sense of external autonomy: 'Well, other people don't come into it.' Participant 6.

## 4.2   Competence

As explained in Sect. 2.2, according to Ryan et al. [31], competence in digital games is expressed in the need to seek out challenges and in the feeling of being able to act effectively. In digital games, competence it is important that players are able to master the game easily and intuitively, that the tasks in the game offer optimum challenges and provide opportunities for positive feedback. Competence was divided into two aspects (see as also Sect. 3.3):

The first aspect focused on competence in playing the game. This study showed that fourteen participants felt satisfied about the way they had played the game: 'Well, I thought I managed it fairly well. Considering I'm still a bit stiff and out of shape right now, but it was actually not bad at all, it went fine.' Participant 11.

The sole participant who was not wholly satisfied did indicate that he improved as he was playing the game. In total, ten of the fifteen participants stated that the next time they played they expected to be better at playing the exergame.

The second aspect focused on competence in dealing with the game interface. All the participants felt quite a sense of competence when playing the game, in how they played it and how they controlled it. Seven of the participants even indicated that their feeling of competence in dealing with the game interface increased as they played: 'Better than expected. I thought beforehand that'll be a disaster. But as far as that goes, it's pretty simple. I call myself digitally challenged, and it was really very easy. But it's also about being calm, because you notice when you raise your finger and you wait a moment, because sometimes you have to wait for a pretty long time before it's really

green, so then there's this wondering is it working or not […]. But I am satisfied with how I controlled the game. Very much so.' Participant 2.

### 4.3    A Closer Look at the Motivation of Exergame Playing Seniors

The average rating (on a scale of 1 to 10) given by the participants for playing the exergame was 7.7. The lowest mark was 7.0, the highest was 9.0. Hence playing the game earned a (very) satisfactory from everyone.

Eleven of the fifteen participants expressed their appreciation of the new experience and the discovery of a new way to exercise. The four other participants had various reasons for the ratings they gave. Two of them, who were prior exergame players, motivated their rating by saying they had enjoyed playing a different game from the Nintendo Wii that they used themselves. Another participant cited as reason for her rating that she had not expected to enjoy it as she is not someone who likes games, but she hadn't been bored for a moment when playing the exergame and she was very pleased with the feedback the exergame provided.

Four of the eleven participants stated explicitly that they considered exergames to offer an attractive great alternative to a current exercise program, such as the home trainer of fitness. Three of these participants moreover commented that they thought it would be fun to play the exergames with the grandchildren when they came to visit. The same went for other family members and friends. The participants also indicated that when they played with the intention of working out, they preferred to play alone.

Five participants explicitly commented that they did not yet, at this point, consider exergames to be of value. Four of them indicated that they preferred other type of exercise to playing exergames. The other participant stated that the games should be better adapted to Dutch culture. She said that, instead of a virtual stroll through New York, she would like to walk around Amsterdam or Utrecht. She also noted that not only the text on the screen, but also the spoken language of the exergame should be Dutch. If these requirements were met, in her view exergames would then become a valuable instrument, because of the exercise aspect.

Other reasons for currently viewing exergames as not of value were the fact that traditional exercise programs (such as walking, playing tennis, bicycling, team sports) were considered more attractive; and that engaging in a sport in front of a screen was inferior to performing an outdoors sport.

There were also participants who emphasized that they would consider the exergames to be more valuable if the surroundings or the movements required by the game were more familiar and recognizable. This is in line with the outcomes of earlier studies, which showed that seniors appreciate playing digital games when these remind them of traditional games from their own childhood [24]. A number of participants also commented that it was fun to have the chance to take part in sports that they used to engage in, or perform sports movements again that they recognized from the past, with the help of the exergame.

### 4.4    Comparison with the Results of the Peng et al. Study

Just as in the case of the students in the Peng et al. study [29], the seniors in our study felt a sense of autonomy and competence. It should be noted, however, that despite the fulfillment of these two innate psychological needs, six of the fifteen participants indicated that they would not recommend the exergame to others. Their reasons for this were that they felt that other people should be free to decide for themselves what they should or should not do, or that they knew of no one in their vicinity to whom they could recommend playing exergames. Possibly the difference in life stage and educational background between these seniors and the students could explain the discrepancy with the Peng et al. study [29]; that study had demonstrated that game elements leading to the fulfillment of the innate psychological needs of autonomy and competence usually have a positive effect on recommending the game to other people.

## 5    Conclusions

The seniors professed to be motivated to play exergames. All rated playing the exergame as (very) satisfactory (between 7.0 and 9.0, average 7.7). They all claimed to be motivated to play exergames by the satisfaction they derived from the game itself and to have experienced no pressure from the game (internal autonomy). Eight participants stated that they expected no external pressure to play exergames (external autonomy). All the participants, save one who was not wholly satisfied, felt really competent to play the game.

Nine of the fifteen participants indicated that they would recommend playing exergames to other people. Next to exergaming for health reasons, the participants were also motivated to play exergames with family members (including grandchildren) and friends for fun.

A potential advantage of exergames for some seniors was the ease with which exercise could be taken indoors. The seniors also praised the choice of games and levels offered by the exergame. The same applied in respect of the way the exercise was to be performed when playing the game and the feedback provided by the game, as it were, to coach the player. The participants moreover commented that they would like to see themselves in a game environment that they were familiar with. Another remark was that it was fun to do sports they used to do again or perform sports movements they recognized from the past with the help of this exergame.

One minus point a female participant mentioned was the fact that the exergame was not tailored to the Dutch culture and that the surroundings therefore evoked less recognition. Adjusting this would boost her motivation to play exergames in the future.

A number of seniors experienced a different barrier towards exergaming. They indicated that they were motivated to play in the future, but stated that exergames were at present not of value to them. The reason for this was because traditional exercise programs currently presented a more attractive choice. They felt that working out in front of a screen was inferior to an outdoor activity. Another reason that was mentioned was that exergames could not replace team sports.

Just as in the case of the students in the Peng et al. study [29], our study also revealed that the innate psychological needs of autonomy and competence of most of these seniors were satisfied and that they were motivated to play exergames. The play element in the exergame played a role in the degree to which the participants consider exergames an attractive exercise program option. In 1938, Huizinga [5] mentioned as characteristics of play that, among other things, it is a voluntary activity, which is accompanied by a feeling of enjoyment and tension. In the case of the exergames played by seniors, this also applies, namely that they not only served as a therapeutic instrument with a capability to exert a positive effect on physical and social wellbeing, but also brought entertainment, providing excitement and fun.

## 6  Discussion

Large-scale quantitative follow-up research (including more higher educated seniors) is essential to determine whether the trends we describe are significant. Our approach, based on Deci and Ryan' Self-Determination Theory [26–28] Peng et al. [29], Song et al. [33] and Shin et al. [34], could serve as a framework for this.

As the results of our study show, seniors would like to play exergames with family members (including grandchildren) and friends, which indicates the importance that the role of relatedness, the third innate psychological need in SDT, may play. In view of the type of exergame, i.e., Your Shape Fitness Evolved 2, which was played on the Xbox 360 Kinect game computer, the focus of our study, like that of Peng et al. [29], was on the innate psychological needs of competence and autonomy. We recommend that relatedness be examined in a follow-up study, and that an exergame suitable for playing together with other people be studied.

Finally, the results reveal that seniors are motivated to play exergames when the game environment or games themselves summon up memories. Exergames designed for Dutch seniors can take this into account by integrating typical aspects of Dutch culture into the exergames. Instead of strolling through New York, the exergame could be adapted to allow players to walk around in Dutch cities, such as Amsterdam or Utrecht. Typically Dutch sports might also be added to exergames for Dutch seniors.

## Appendix Topic List [Abbreviated Version for This Article]

**Topic List (Prior to the Game Session)**

1. **Personal data** (male /female, age, highest level of education completed)

2. **Use of PC/Laptop/IPad or other tablet/Smartphone** (If never used: why?, if used: on average, how many days a week, on average, how many hours a day, what is it used for?)
3. **Use of games** (If games never played: why?, if games are played: why? on how many days a week, on average, how many hours spent playing games, on average, first game why play/never play?)
4. **Physical activity** (Physically active on how many days a week, if on average physically active on less than one day a week: why?, value sufficient physical activity? What is sufficient amount physical activity?)
   **Administration of Timed Get Up and Go Test** (http://www.fysiovragenlijst.nl/docs/pdf/Timed%20Get-Up-and-Go-Test%20_TGUGT_.pdf)

   **Topic List (After the Game Session)**

5. **Autonomy**
5.1 Internal autonomy (Pressure-Tension, Perceived choice: intrinsically motivated/not motivated to play the game)
5.2 External autonomy (Pressure-Tension Perceived choice: extrinsically motivated/not motivated to play the game)
6. **Competence**
6.1 **Competence in playing the game** (can/cannot play the game)
6.2 **Competence in dealing with the game/interface** (able/unable to understand and use the game interface)
7. **Game enjoyment** (exciting, entertaining/pleasurable, interesting, not fun, boring, not enjoyable)
8. **Motivation for future play** (willingness to continue playing)
9. **Likelihood of game recommendation** (advising others to play the game)
10. **Self-efficacy for exercise using the game** (willingness to play the game twice a week in certain situations, such as when tired or bad weather)
11. **Game rating** (If you had to give playing this game a school mark, what would that be?)

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