Wellbeing experienced by digital players: Comparing real-life and gaming perspectives

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ABSTRACT
The on-growing consumption of digital games has worried many. Recent barometers show that 75% of Finnish citizens and 67% of Australians play video games. Earlier studies suggest many adverse effects on gaming. Digital games are nevertheless largely used, and thus understanding the positive experiences of gaming is important.

To better understand why gaming is so popular, this research examined the positive subjective experience of gaming. The gaming preferences of players and the subjective experiences of digital gaming were examined by a web survey (N=513) distributed to Finnish and Australian gaming forums. The respondents were players from Australia and Finland, who played on average 20.16 hours per week. The players' specific preferences for game dynamics were examined with an upgraded version of the Game Dynamics Preferences Questionnaire (Vahlo, Kaakinen, Holm & Koponen, 2017) consisting of 50 items. Using exploratory factor analysis, these game dynamics were grouped into core dynamics. A cluster analysis based on the factor scores of the questionnaire answers was then used to divide the gamers to different profiles. The survey also contained four psychological scales: self-efficacy, curiosity, subjective vitality and psychological empowerment. There were two versions of each of these scales: first participants responded to the scales from real-life perspective, then from gaming perspective. By comparing the responses given in real-life vs. gaming perspective, the positive subjective experience of gaming could be calculated.

This study conducted six core dynamics: Assault and Coordinate; Manage; Affect, Aesthetics and Expression; Explore and Develop the Gameworld; Interact; and Logic and Problem Solving. Based on the dynamics, the players divided into five gaming profiles: the Wise Adventurer, the Looter-Adventurer, the Explorer, the Commander and the Companion. The profiles consisting of heavy gamers had more positive subjective experiences of gaming, compared to light gamers. All of the different gaming profiles experienced significantly more curiosity when gaming, compared to real-life. The results suggest that heavy gamers have positive subjective experiences during gaming. In the future these subjective experiences should be further examined by controlled intervention studies.

KEYWORDS: Digital gaming, player profiles, gamer's wellbeing

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1. INTRODUCTION

In this digital age, many are concerned about the effects that gaming has on players. To understand the growing consumption of gaming, this thesis measures the potential positive subjective experience of gaming (i.e. Vahlo, Kaakinen, Holm & Koponen, 2017; Granic, Lobel & Engels, 2014). In this study gamers' preferences were not only defined as preferences for certain game genres (e.g., action-adventure games), but preferences were examined using a 50-item, specific list of game dynamics (e.g., navigating in dungeons and overcoming its dangers), that the players rated (Vahlo et al., 2017). Players were then grouped according to their game dynamics preferences, and the groups were compared with respect to the psychological positive subjective experience associated with gaming.

1.1. Game players

Gaming is a fast-growing pass time activity. In Finland, 75% of the whole population plays digital games, of which 22.2% played daily (Mayra, Karvinen, & Ermi, 2016). In contrast, 67% of Australians play video games, 98 minutes being the average daily total play for males and 77 minutes for females (Brand, Todhunter, & Jervis, 2017).

The research on the effects of gaming and studies on the gaming behavior with players from different backgrounds is a novel field, and thus the results vary. Gaming could be thought to disturb school and affect a players schooling level, but Durkin & Barber (2002) found that game players had more positive school engagement and mental health than peers who did not play. Hartanto, Toh & Yang (2018) found that academic performance was affected by weekday gaming negatively, but positively when gaming happened during weekends. Giammarco, Schneider, Carswell & Knipe (2015) state that video game motivations are differentially associated with career interests. In example, Giammarco et al (2015) found out that if competition was a players gaming motive, it correlated significantly with an interest to have a career as an authoritarian leadership.

Recent studies have showed interesting results on other background factors, too. When it comes to game player's age, Rehbein, Staudt, Hanslmaier & Kliem (2016) found that older and more educated gamers used less time on gaming. Considering gender, Rehbein, Staudt, Hanslmaier & Kliem (2016) found that male gamers who use more time

on gaming more likely prefer role-playing and shooter games. Nam (2017) found that males had more positive and also more negative attitudes toward gaming than females, who seemed to have less polarized attitude. Liu (2016) showed that with female gamers hedonic outcome expectations altered significantly more behavioral intentions, and that male gamer's behavior was significantly more influenced by utilitarian outcome. Though the given results are interesting, further research on this field is important get a more coherent understanding on game players.

1.2. Psychological effects associated with gaming

Gaming can have many negative influences on players, and thus it has been the main focus of research in the field of psychology of gaming for years. For example, Petry and colleagues (2014) discussed the possible addition of internet gaming disorder (IGD) to DSM-5, with Griffiths et al (2014) working toward international consensus on the definition of a gaming addiction. Their work aimed on assessing criteria for developing a definition for internet gaming disorder. A meta-analysis of IGD research revealed the defining of the disorder to be inconsistent and in need of better measures (Zajac, Ginley, Chang & Petry, 2017).

Previous research has mainly concentrated on the adverse effects associated with heavy gaming. For example Berle, Starcevic, Porter and Fenech (2015) investigated the psychopathological effects of playing massively multiplayer online role-playing games (MMORPGs), and reported gamers to have problematic computer use and life interference. This means that gamers played too much and let it disturb their everyday life. However, when comparing the results of the Symptom Checklist-90 scales of MMORPG players and non-MMORPG players, increased psychopathology was not found in either group. Andreassen and colleagues (2016) found with a variety of gamers from different backgrounds, that addictive use of video games was associated with ADHD, OCD, anxiety and depression. Gaetan et al (2016) suggested that regular gamers have increased alexithymia, low emotional reactivity and less emotion expressing, but with a small data. Problematic internet use has also been associated with social anxiety (Lee & Leeson, 2015). Gaming has been stated to numb pain perception (Weger & Loughnan, 2014) and to affect negatively on identity, in so that a player trusts a computers judgement more than one's own (Weger, Loughnan, Sharma & Gonidis, 2015). These studies support the assumption that gaming affects negatively on player's mental wellbeing. Gaming is nevertheless a growing pastime activity. Recent studies have

criticized the psychopathological effects of gaming, and the reasons for psychiatric symptoms based on gaming have been questioned. For example, Király, Tóth, Urbán, Demetrovics, & Maraz (2017) found that time used on gaming did not serve as a predictor for addictive behavior, even though it has generally been assumed to be the main negative factor on a players mental health.

Only a few studies have investigated the possible gains a player can have of gaming. Chisholm and Kingstone (2015) found support for the hypothesis that action video gaming improves cognitive skills, such as target selection and response based processes (see also Green & Bavelier, 2007, 2012, 2013). In a recent review article, Granic and colleagues (2014) proposed that video games can improve the effectiveness of an intervention for a great variety of disorders, as games enhance motivation, increase engagement, and provide opportunities for practicing new skills in flexibly designed contexts. This means that gaming could possibly have benefits on the players' mental health. Granic et al (2014) also found many emotional benefits of gaming, i.e. positive emotional experiences, relaxation, decrease of anxiety and feelings of flow. Though it is still a new and undiscovered field, understanding the positive effects of gaming is important in this digital age. It is also vital for understanding why playing can be addictive, and thus is an important research field in the psychology of gaming.

Based on the aforementioned studies it can be stated that the effect of gaming on a player is diverse and not altogether negative. However, the subjective experience of gaming has not yet been researched. The purpose of this study was to examine the relationship between gaming and experiences of self-efficacy, curiosity, subjective vitality and psychological empowerment. These can be considered to be aspects of psychological wellbeing.

Self-efficacy reflects an optimistic self-belief (Schwarzer, 1992). Self-belief is described as a state where one believes she or he can do new or difficult tasks, or cope well in different situations. High self-efficacy, then, has a positive effect on goal-setting, effort investment, persistence in the face of obstacles, and recovery from setbacks. In a way, self-efficacy works as a form of resilience. Bandura (1977) states that one's expectations of efficacy determine the time and effort one uses to deal with obstacles. This means that the amount of self-belief one has effects on one's behavior directly.

Curiosity can be defined as recognizing, embracing, and seeking out knowledge and new experiences (Kashdan et al, 2009). Curiosity supposedly plays a role in the development of intelligence, wisdom, happiness, meaning in life, distress tolerance, and

satisfying and engaging social relationships (for reviews, see Kashdan, 2009; Renninger, Hidi, & Krapp, 1992; Silvia, 2006). Intolerance of uncertainty is an important risk factor for anxiety disorders (Dugas, Freeston, & Ladouceur, 1997). Kashdan et al (2009) states, that this way, being curious and having high tolerance of uncertainty is good for one's wellbeing.

Kashdan et al (2009) divided curiosity into stretching and embracing. Stretching is when one is motivated to seek knowledge and new experiences, and embracing is a general willingness to embrace the novel, uncertain, and unpredictable nature of everyday life. Curiosity correlates strongly with openness to experience and personal growth (Kashdan et al., 2009). Kashdan states that being curious stimulates exploratory behavior, and thus may lead to discovery and growth.

Subjective vitality is defined as one's conscious experience of possessing energy and aliveness. The feeling of energy and aliveness varies amongst individuals. This function is associated with self-actualization, self-determination, mental health and self-esteem. It is also related to somatic wellness, for physical wellbeing affects the feeling of vitality. Subjective vitality can be influenced by both physical and psychological factors. Ryan and Frederick (1997) state that in their point of view subjective vitality reflects psychological wellness. Therefore, subjective vitality can be seen as an indicator of wellbeing.

Psychological empowerment refers to the increase of an individual's internal motivation. Originally the term was used to describe an individual's work motivation (Spreitzer, 1995), but in this thesis it is used to describe an individual's motivation in life and during gaming. Spreitzer based on Thomas and Velthouses (1990) definition of empowerment, which is the "increased intrinsic task motivation manifested in a set of four cognitions reflecting an individual's orientation to his or her work role" (Thomas & Velthouse, 1990, Spreitzer, 1995, p.1443). The four cognitions are meaning, competence, self-determination and impact. Spreitzer states that meaning describes the value of the goal or purpose. This value is judged in relation to an individual's own ideals or standards. Competence is an individual's belief in his or her capability to perform activities with skill. Self-determination is an individual's sense of having choice in initiating and regulating actions. Finally, impact is defined as the degree to which an individual can influence strategic, administrative, or operating outcomes at work. Psychological empowerment is an essential factor in psychological wellbeing, as empowering an

individual has been reported to correlate with creativity (Spreitzer, 1995) and more innovative behavior (Kanter, 1983).

These four concepts of emotional wellbeing (self-efficacy, curiosity, subjective vitality and psychological empowerment) can be experienced during gaming. Douglas (2012) studied the effect gaming has on self-efficacy, and found that playing Suicide Risk Assessment Game (SRAG) improved counselors' self-efficacy with recognizing persons with suicidal thoughts. In this game, the goal is to learn to assess whether a person has a risk of committing a suicide. The study compared three groups: control, SRAG players, and SRAG and evaluation-focused discussion groups. These three groups were compared on counselor self-efficacy with respect to suicide assessment. The group who played SRAG and attended an evaluation-focused discussion group improved distinctly more than the other groups in self-efficacy. Thus, Douglas (2012) believes gaming to have a role in gaining self-efficacy. It should be considered that SRAG is what we can call a serious game. Serious games' purpose differs from leisure video and other entertainment games, which are on focus in this study. The serious games have the purpose of learning compared to entertainment games. It should also be considered that here the results were found together with the evaluation-focused discussion group, not independently with gaming.

Curiosity can be built up by a game that contains a backstory (Wouters, van Oostendorp, Boonekamp & van der Spek, 2011). This was found with a cancer cell destroying game, where the enhancing of the background story effected on the curiosity towards the game. Thus, adding up the entertainment content to the game affected curiosity positively. However, it should be considered that the cancer cell destroying game is a serious game, not a leisure game. Westrom and Shaban (2014) found that curiosity was higher during a non-instructional game compared to an instructional game when examining motivation. They also noticed that curiosity leveled down as players gained experience.

Game playing may also lead to increased feelings of energy, and subjective vitality. This was found when gaming was compared to no consumption of media or watching a gameplay video (Rieger, Frischlich, Wulf, Bente & Kneer, 2015). It was found that players felt most energized when playing a game. The difference between game playing and videos is that gaming demands interactivity. Rieger et al (2015) believes that interactivity is a good distraction from negative mood. That is, it leads our mind to a more positive mood.

Finally, gaming may also improve experiences of empowerment. Kostenius and Hertting (2016) examined subjective experiences associated with interactive technology use, video gaming being one form of it. In this study, students from several Nordic countries reported increased feelings of empowerment when using interactive technology (Kostenius & Hertting, 2016).

Even though it seems likely that gaming can have positive experiences that might lead to increased psychological wellbeing, it is possible that the experience is related to the gaming preferences a player has, and to the amount of time used for gaming. Thus, I assume that certain types of players have more positive subjective experiences of gaming than other types. Different player types can be assumed to vary in how much time they spend on gaming. Next, I will describe in more detail how player preferences were defined in this study.

1.3. Player preferences and gamer types

Until now, it has been very common in the gaming field to divide players by game genres, which are usually divided into Action, Action-Adventure, Adventure, Role-Playing, Simulation, Strategy and Massively Multiplayer games. This, however, does not take into consideration the variation of preferences gamers have, even within genres. One genre can consist of games that are in many ways different compared to each other. Also players who play a certain genre can prefer it for multiple different reasons. Yee (2006) took a step towards understanding the variety of players' motivations and made a theory of his longitudinal study on motivations of gamers playing Massively Multiplayer Online RolePlaying Games (MMORPGs). He found six play motivations: Achievement, Relationship, Immersion, Escapism, and Manipulation. These motivations are based on gamer's preferences on why they like to play. While this view opens some insights into motivations to play, it does not take into consideration the exact activities embedded in the games, such as "sneaking around", "driving in high speed", "shooting", etc., which may also drive player's interests in certain games. Knowing what kind of game activities or dynamics different players prefer is of importance for understanding player types, which is essential in the field of game psychology. It is also beneficial to the development of theoretical accounts of video game playing. Moreover, the gamers in Yee's research were only players of MMORPGs, which also makes it difficult to generalize the results. Another approach to motives was taken by De Grove, Cauberghe, & Van Looy (2016), criticizing Yee's (2006) theory and other former theories of motives. De Grove,

Cauberghe, & Van Looy (2016) conducted seven motives: performance, agency, moral self-reaction, social, narrative, pastime, and escapism. As stated before, motivations are important to understand, but are not helpful in specifying gamers to certain types.

In a recent study, Vahlo and colleagues (2017) approached gaming preferences from the perspective of specific game dynamics. They developed a Game Dynamics Preferences Questionnaire, which was based on a qualitative analysis of written reviews of 700 contemporary digital games. By conducting a factor analysis on the dynamics, Vahlo et al (2017) found five game dynamics categories: assault, manage, journey, coordinate and care. Assault included i.e. breaking the law and conquering territories; manage had items considering i.e. interaction based on acquiring energy and managing citizens; journey had i.e. exploring the gameworld and creating a playable avatar; coordinate included i.e. matching tiles and staying in rhythm by dancing; and finally care consisted of i.e. flirting and taking care of pets.

Based on these preferences, Vahlo et al (2017) analyzed player profiles, and found seven different player types: The Mercenary, the Companion, the Commander, the Adventurer, the Explorer, the Daredevil and the Patterner. The Mercenary group consisted of mainly heavy gamers, mostly males, who preferred Assaulting, and of the specific dynamics i.e. killing and exploring the gameworld. Players on the Companion profile were mostly females who favored Journeying and Caring, and of the specific dynamics i.e. befriending with other characters and developing a village. The Commander group comprised mostly of males, who preferred to Manage, and of the specific dynamics they preferred i.e. strategizing. The Adventurer consisted of players who preferred Journeying and quite as much Assaulting, and of the specific dynamics i.e. acting as the protagonist. The Explorer had light gamers, mostly older female who liked Journeying and to Coordinate, and of the specific dynamics i.e. collecting rare items and treasures. The Daredevil group consisted mostly of male gamers who favored Assaulting and Coordinating, and of the specific dynamics i.e. racing. Lastly, the Patterner contained mainly older female who preferred to Coordinate, and of the specific dynamics preferred i.e. matching tiles together.

I used Vahlo et al (2017) Game Dynamics Preferences Questionnaire in order to find different game dynamics preferences categories and player types of heavy gamers. The gamers who play more than average might have a more exquisite taste on preferred dynamics, based on the experience gained from using time on gaming. This was further investigated in this Thesis.

This thesis focuses on defining gamer types among gamers, and on examining whether positive subjective experiences of playing vary between different types. Distinct specific dynamics effect emotions differently (i.e. murdering versus dancing), thus I might assume that profiles, which are based on the differences on dynamics preferences, also differ on positive subjective experiences of gaming.

1.4. Research questions and hypotheses

The purpose of this research was to 1) examine gaming preferences of heavy gamers and 2) find out potential positive subjective experiences of gaming. Thus, the participants to this study were recruited via different gaming sites (i.e. internet discussion forums and portals). The participants played on average 20.38 hours per week, which is significantly more than what an average Finnish game player plays: 4.14 hours per week (Mayra, Karvinen & Ermi, 2016).

The research questions were:

1) What kind of game dynamics preferences and gaming profiles digital gamers demonstrate?
2) How do gaming preferences correlate with psychological experiences associated to gaming?

As for the gaming preferences and player types, I expected gamers to demonstrate similar preference categories to those that Vahlo et al. (2017) reported. In this thesis the player types are described by different background variables, such as age, gender and schooling level. Time used on gaming is also on focus, for it seems to vary based on gaming preferences. The survey also included general questions about gaming, more specifically about different digital games, genres and reasons to play. These were asked to describe the player types more thoroughly. Secondly, I expected gamers to gain higher scores on the four psychological wellbeing scales while gaming, compared to real-life. I also explored differences between different player types in positive subjective experiences related to gaming. As there is no previous research on positive subjective experiences of gaming for different player types, no specific hypotheses were set.

2. METHOD

2.1. Participants

Participants were recruited via different internet forums and social media. To get Finnish participants, I shared the survey link with three forums: Facebook-group Geek Women Unite! (Finland), pelilauta.com and ylilauta.org. To get Australian participants, I shared the survey with 28 gaming forums (see appendix A). Data was collected during a 1.5 month period (16.2-4.4.2016). The aim was to compare gamers of these two countries and to see how general the given effects are.

A total of 513 volunteers responded to the survey. Respondents who were under 18 years old and answers that were obviously misleading were discarded. In the final data there were 468 participants, of whom 321 were from Finland, and 147 were Australian.

The data contained 93 female respondents (19.87% of the whole data). Five participants (1.07%) answered their gender to be 'other', and the remaining 370 (79.06%) were male. The mean age of the participants was 30.20 years (*SD*=9.09). The gamers played on average 20.16 hours a week (*SD*=16.09).

The Finnish gamers were able to sign up for another study conducted at the University of Turku.

2.2. Materials

The survey had two versions, one in English and one in Finnish. All of the questions were in their original form in both languages, or were written with a clear language, e.g. "How old are you?" The Finnish language version was shared to the Finnish gaming forums, and the English language version to Australian ones.

The survey started with background questions about respondent's gender, age and education. After background questions, four psychological scales were presented: The General Self-Efficacy Scale (GSE) (Schwarzer & Jerusalem, 1995), Curiosity and Exploration Inventory (CEI-II) (Kashdan et al. 2009), Subjective Vitality (Ryan & Frederick, 1997), and Psychological Empowerment (Spreitzer, 1995). These scales were presented twice: at the beginning of the survey the scales were to be scored from the real-life perspective and at the end from the gaming perspective, i.e. how respondents feel in a gaming context.

GSE. First of all, the survey included questions on self-efficacy (Schwarzer & Jerusalem, 1995). The scale contains 10 items which the subjects rates on how true the

fact is in the subject's life, for example: "*I can always manage to solve difficult problems if I try hard enough.*" The response has four possible options (1 = not at all true, 2 = hardly true, 3 = moderately true, 4 = exactly true). In the present data, the reliability (Cronbach's alpha) of the scale regarding real-life was 0.87, and regarding gaming 0.91.

CEI-II. Secondly the survey had question on curiosity and exploration (Kashdan et al. 2009). The scale contains 10 items which the subject rates for how accurately they reflect the way the subject generally feels and behaves, in example: *"I actively seek as much information as I can in new situations."* Participant rates items with a five-point scale (1 = very slightly or not at all, 2 = a little, 3 = moderately, 4 = quite a bit, 5 = extremely). In the present data, the reliability (Cronbach's alpha) of the scale regarding real-life was 0.87, and regarding gaming 0.89.

Subjective Vitality. Thirdly, the survey had questions on subjective vitality (Ryan & Frederick, 1997). The scale contains 6 items which the subject rates in terms of how they apply to them and their life at the present time, in example: *"I feel alive and vital."* These are rated with a scale of 1 to 7 (1 = not at all true, 7 = completely true). In the present data, the reliability (Cronbach's alpha) of the scale regarding real-life was 0.91, and regarding gaming 0.91.

Psychological Empowerment. Finally, the survey had questions that measure empowerment (Spreitzer, 1995). The scale contains 12 items the subject rates by choosing the answers that describe them the best, in example: *"My everyday life is very important to me."* These the subject rates with a scale of 7 options (1 = strongly disagree, 2 = moderately disagree, 3 = slightly disagree, 4 = neither agree nor disagree, 5 = slightly agree, 6 = moderately agree, 7 = strongly agree). In the present data, the reliability (Cronbach's alpha) of the scale regarding real-life was 0.90, and regarding gaming 0.91.

General gaming questions. After the psychological scales, the questionnaire had questions about game playing. First, I asked how much different digital games the participant had played in the past year. Second, I asked how much of which genre the participant usually plays, compared to other genres. Third, I asked the participant to estimate how much time they use to gaming on average in a week. Fourth, participants responded to 12 arguments on why they play games (e.g. I play with my family or friends for the company), which the subject had to rate regarding on how close they are to his or her opinion. The general gaming questions were asked so that it could be possible to compare whether gaming profiles differ on e.g. gaming habits.

Game Dynamics Preferences Questionnaire. The survey included an updated version of the Game dynamics preferences questionnaire (Vahlo et al., 2017), which consists of 50 detailed gaming actions. The participant rated how they would prefer different game dynamics, based on their earlier, good experiences or on their interest on trying a new game, with a 5-point scale (1 = very dissatisfying, 2 = dissatisfying, 3 = neither, 4 = satisfying, 5 = very satisfying). All of the detailed gaming actions are listed in Appendix B.

2.3. Procedure

The data was collected with an online survey tool (Webropol). The first page of the survey contained the informed consent. After this the survey had background questions on gender, age and schooling level. Then it had the four psychological scales (GSE, CEI-II, Subjective Vitality and Psychological Empowerment) in real-life perspective. After these were general questions regarding gaming - how much of different digital games the player has played, genre preferences, time used weekly on gaming and why the participant plays games - and the Game Dynamics Preferences Questionnaire. Lastly, it had the same psychological scales as in the beginning, this time in gaming perspective. Answering the survey took about 20 minutes. In the end of the Finnish version of the survey the participants were able to sign up for laboratory experiments to be conducted in the future.

2.4. Design and statistical analyses

In order to identify core game dynamics, the game dynamics preference data was analyzed with an exploratory factor analysis, using Principal Axis Factoring and Varimax rotation.

In order to identify player groups on the basis of their game dynamics preferences, the factor scores were analyzed with a two-step cluster analysis. This method uses first the sequential, then the hierarchical clustering method. The two-step clustering method performs well if all variables are continuous, but less satisfyingly with mixed types (Bacher, Wenzig & Vogler, 2004). I used the method with continuous variables - the regression factor scores - which were computed using Principal Axis Factoring on the Gaming Dynamics Preferences Questionnaire results.

The strength of association was calculated with Multinominal Logistic Regression analysis, where the clustering was a Dummy –coded independent variable, and country, gender, age, schooling and play time were dependent variables.

The differences of the positive subjective experiences of real-life versus gaming were tested separately regarding the four different psychological measurements. First they were tested with a repeated measures ANOVA, in which the context (life vs. gaming) was a within-subjects and the cluster membership as a grouping factor. Follow-up comparisons were performed with repeated measures t-tests separately for each five clusters.

3. RESULTS

3.1. Game dynamics preferences questionnaire

Based on Vahlo et al (2017) analysis, the game dynamics preference data was analyzed with an exploratory factor analysis, using Principal Axis Factoring and Varimax rotation, to ensure alike solution. One item ("solving problems by creative thinking and by trial and error") showed restricted variance (only scores 4 or 5), so it was discarded from the analyses. By examining the scree-plot, it was seen that the curve leveled off at 6 factors. The eigenvalue of the sixth factor was 1.79. The six factor model was retained.

Table 1 (appendix B) contains the means, standard deviations and loadings to the factors for each item. Loadings >.30 were considered to indicate that the item loaded on a factor. The first factor (*Assault and Coordinate*) contains 12 items including actions that require coordinating, being aggressive, competing, racing in high speed, sportiness and lawlessness, for example "Firing enemies and avoiding enemy fire in a high speed" or "Racing in a high speed".

The second factor (*Manage*) has 9 items, and these have to do with managing, planning and leading. These contained actions such as "Managing cities, villages or castles and its inhabitants and resources" and "Guiding, protecting, developing and herding population, people, followers or a brood".

The third factor (*Affect, Aesthetics and Expression*) has 8 items. These actions are about lifelike deeds, makeup and dress up, socializing and managing relationships, and performing in rhythm. These were for example "Flirting and dating or hugging and kissing" and "Decorating rooms or houses".

The fourth factor (*Explore and Develop the Gameworld*) contains 9 items about journeying in the gameworld, crafting items and developing the character, for example "Developing a character's skills and abilities" and "Searching and collecting rare treasures, items, characters or weapons hidden in the game".

The fifth factor (*Interact*) has five items related to using social skills to ones benefit by e.g. diplomacy, and empathy, for example "Acting as the main character and making meaningful choices that affect the game" and "Befriending with in-game characters, interacting with them and aiding them if in trouble".

The sixth factor (*Logic and Problem Solving*) has six items that require solving problems with logic. These contained the actions "Pondering and solving logical and mathematical problems and challenges" and "Memorising and solving memory-based challenges".

Some of the items had loadings for several factors, but only one item had almost similar loading on two factors. This item was "Matching tiles, diamonds or other objects together to clear them away", which loaded on both factors 3 (0.39) and 6 (0.40). I chose this item to be in factor six (Logic and Problem Solving), but it is also understandable that the item loaded on factor three (Affect, Aesthetics and Expression), which has items e.g. regarding aesthetics.

3.2. Cluster analysis

In order to identify player groups on the basis of their game dynamics preferences, the factor scores for each participant were subjected to a two-step cluster analysis. Compared to the specific dynamics, factor scores do not contain variance produced by measurement error, and were thus a better basis for the two-step cluster analysis. After comparing results received from a hierarchical and a k-means clusters analysis, a solution with 5 clusters was retained. Based on the dynamics preferences of the players, clusters were named *the Wise Adventurer*, *the Looter-Adventurer*, *the Explorer*, *the Commander* and *the Companion*.

The descriptive statistics for the background variables for each cluster are represented in Tables 2 and 3. Comparisons between the clusters were performed using ANOVA's, followed by contrasts in which the mean for each cluster was compared to the overall mean; categorical variables were analyzed with chi squared test. For gender, respondents who had selected "other" were excluded from the analyses due to low

frequency. The schooling levels are different in both countries, which is why they are presented separately for Finnish and Australian respondents.

Results for the comparison of groups by contrasts are following. Firstly, the profiles did not differ significantly by age, $F(4, 467)=619.05$, $p=0.11$. Finnish and Australian gamers divided to the clusters unevenly, $X_2(4, N=468)=21.60$, $p<.001$, so that cluster 1 had the smallest frequency of Australians (12.68%), and cluster 5 had the biggest (45.88%). The profiles differed by gender, $X_2(4, N=463)=128.70$, $p<0.001$, so that cluster 4 had the smallest frequency of female gamers (2.06%), and cluster 1 had the biggest (67.65%). The clusters differed by play time $F(4, 463)=6512.98$, $p<0.001$, so that cluster 5 used the least amount of time on playing (15.52 hours/week), and cluster 2 used the most (25.19 hours/week). Finally, the profiles differed by schooling levels, $X_2(16, N=468)=28.21$, $p<0.05$, which can be further examined from Table 3.

Table 2. Descriptive statistics of the background variables separately for the five clusters.

	Cluster										
	1 = the Wise Adventurer		2 = the Looter-Adventurer		3 = the Explorer		4 = the Commander		5 = the Companion		Total mean
	total	%	total	%	total	%	total	%	total	%	
N	71	15.17%	134	28.63%	81	17.31%	97	20.73%	85	18.16%	468
	M	95% CI	M	95% CI	M	95% CI	M	95% CI	M	95% CI	
Age	30.34	[28.48, 32.20]	28.67	[27.23, 30.11]	30.04	[28.19, 31.89]	30.76	[28.91, 32.62]	31.99	[29.59, 34.39]	30.20
Country	N	% within cluster	N	% within cluster	N	% within cluster	N	% within cluster	N	% within cluster	
Australia	9	12.68%	46	34.33%	21	25.93%	32	32.99%	39	45.88%	147
Finland	62	87.32%	88	65.67%	60	74.07%	65	67.01%	46	54.12%	321
Gender	N	% within cluster	N	% within cluster	N	% within cluster	N	% within cluster	N	% within cluster	
Female*	46	64.79%	14	10.45%	9	11.11%	2	2.06%	22	25.88%	93
Male*	22	30.99%	119	88.81%	71	87.65%	95	97.94%	63	74.12%	370
Time	M	95% CI	M	95% CI	M	95% CI	M	95% CI	M	95% CI	
Hours /Wk	16.41	[13.44, 19.38]	25.19	[22.16, 28.23]	21.47	[17.76, 25.18]	18.93	[16.12, 21.73]	15.52	[12.17, 18.86]	20.38

*Note that gender contains a smaller frequency, for the value "other" was discarded from these tests

Table 3. Schooling level values for the five clusters, separately for Australian and Finnish participants.

	Cluster									
	1 = the Wise Adventurer		2 = the Looter-Adventurer		3 = the Explorer		4 = the Commander		5 = the Companion	
Australia	N	% within cluster	N	% within cluster	N	% within cluster	N	% within cluster	N	% within cluster
Less than year 12	0	0.00%	3	2.24%	1	1.23%	0	0.00%	4	4.71%
Year 12	3	4.23%	14	10.45%	6	7.41%	6	6.19%	8	9.41%
Vocational qualification	2	2.82%	5	3.73%	3	3.70%	3	3.09%	1	1.18%
Undergraduate diploma	0	0.00%	6	4.48%	5	6.17%	4	4.12%	6	7.06%
Bachelor's degree	1	1.41%	16	11.94%	5	6.17%	14	14.43%	18	21.18%
Master's degree	3	4.23%	2	1.49%	1	1.23%	5	5.15%	2	2.35%
Finland										
Elementary school	0	0.00%	3	2.24%	4	4.94%	5	5.15%	2	2.35%
Vocational school	5	7.04%	28	20.90%	17	20.99%	14	14.43%	11	12.94%
High school	15	21.13%	23	17.16%	19	23.46%	19	19.59%	14	16.47%
Undergraduate degree	26	36.62%	26	19.40%	14	17.28%	22	22.68%	12	14.12%
Graduate degree	16	22.54%	8	5.97%	6	7.41%	5	5.15%	7	8.24%

The Wise Adventurer profile (cluster 1) consists mainly of Finnish, female gamers who enjoy solving problems and exploring. The cluster has 71 participants, 15.17% of all respondents, making this cluster the smallest. The mean age in this group was 30.34 years (SD=7.85), and 87.32% were Finnish. This cluster thus has the biggest frequency of Finnish gamers. Two thirds of the participants categorized into this cluster were women, being half of all the women gamers in the whole data. The Finnish participants of this cluster had most likely an undergraduate degree, Australians had a year 12. The mean play time per week in this cluster was 16.41 hours (SD=12.54), which was significantly under the average.

Gamers in this cluster did not significantly prefer any certain game type. They gave highest scores to role-playing games (M=5.10, SD=1.35), but this did not differ significantly from the other genres. All of the five profiles had the same main reasons to play games: because it is fun, for wanting to involve deeply to the game, for relaxing, and for being interested in different kinds of games. When excluding these, gamers in this group played to experience success (M=3.32, SD=1.33) and to avoid anxiety (M=3.10, SD=1.53).

Gamers in this cluster prefer solving problems, exploring and enjoying the game. They had higher than average scores on factors 6: Logic and Problem Solving (M=0.83, SE=0.08), 3: Affect, Aesthetics and Expression (M=0.65, SE=0.09); and 4: Explore and Develop the Gameworld (M=0.14, SE=0.10). They had lower than average scores and therefore disliked factors 5 (M=-0.20, SE=0.12), 2 (M=-0.68, SE=0.11), and 1 (M=-1.02, SE=0.11). Figure 1 presents the clusters preferences on the six core dynamics.

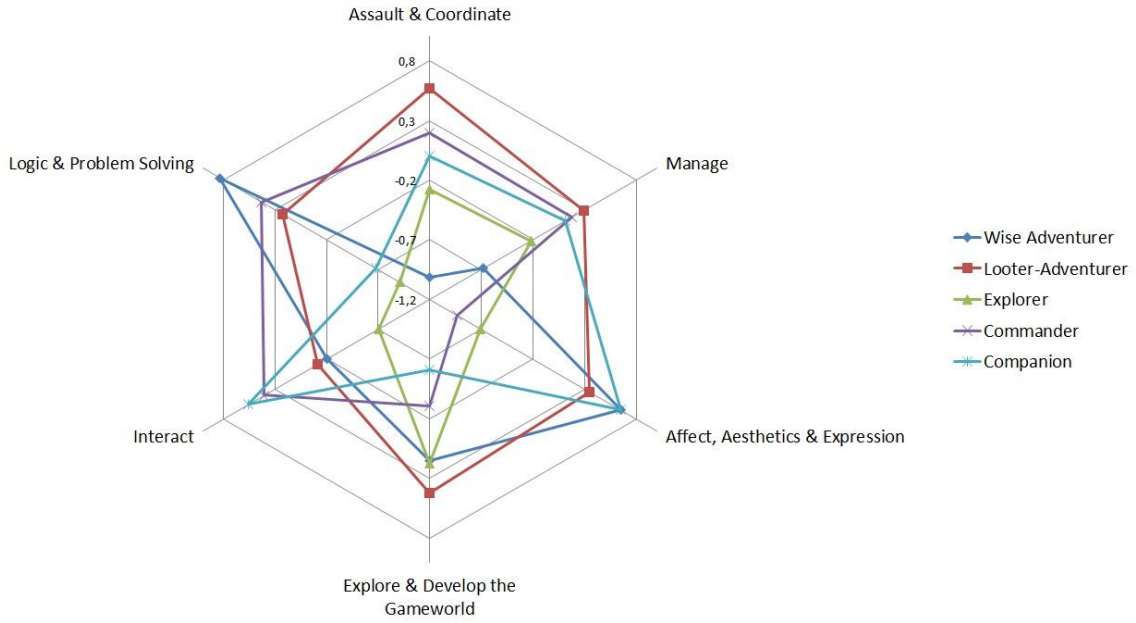


Figure 1. Core dynamics preferences of the clusters

The Looter-Adventurer profile (cluster 2) consists mainly of male gamers who use a lot of time on gaming and generally enjoy a great variety of actions in games. The cluster has 134 participants, 28.63% of all respondents, being the biggest cluster. The mean age was 28.67 (*SD*=8.44), which is significantly under the average and is the lowest average of all clusters. One third of the gamers in this cluster were Australian, and 88.81% were male. Of the gamers in this cluster, 20.9% had a Finnish vocational schooling level completed, and 19.4% had a Finnish undergraduate degree. Australians had most likely a year 12 or an undergraduate degree. The participants used 25.19 hours per week on gaming (*SD*=17.77), which is the highest average of all the clusters.

Gamers in this cluster scored PC and console games downloaded from a web store (*M*=3.93, *SD*=1.21) and single player computer games (*M*=3.89, *SD*=1.32) highest, and they gave highest points to role-playing games (*M*=5.03, *SD*=1.20), but these scores were not significantly different. When excluding the reasons that where same with all of the

profiles, gamers in this group played to have challenges and to develop (*M*=3.34, *SD*=1.20), to experience success (*M*=3.25, *SD*=1.32) and with family or friends for the company (*M*=3.18, *SD*=1.34).

This group enjoyed all the variety of gaming except interaction. They scored over average on factor 1: Assault and Coordinate (*M*=0.57, *SE*=0.05), factor 4: Explore and Develop the Gameworld (*M*=0.43, *SE*=0.04); 3: Affect, Aesthetics and Expression (*M*=0.35, *SE*=0.05); 2: Manage (*M*=0.29, *SE*=0.06); and 6: Logic and Problem Solving (*M*=0.23, *SE*=0.04). The only factor they score just below average on is factor number 5: Interact (*M*=-0.12, *SE*=0.07). Figure 1 presents the clusters preferences on the six core dynamics.

The Explorer profile (cluster 3) consists of gamers who do not prefer any actions other than developing a character and exploring the gameworld. The cluster has 81 participants, 17.31% of all respondents. The mean age was 30.04 (*SD*=8.37), and 25.93% were Australian gamers. This cluster had 87.65% male gamers. The Finnish participants of this cluster had most likely done high school, Australians had a year 12. This cluster used weekly 21.47 hours on gaming (*SD*=16.79).

Gamers in this cluster scored multiple player web games (*M*=3.50, *SD*=1.55) and single player computer games (*M*=3.30, *SD*=1.37) highest, and gave highest scores to action games (*M*=3.84, *SD*=1.96), action-adventure games (*M*=3.86, *SD*=1.55) and role-playing games (*M*=3.85, *SD*=1.92) but these scores were not significantly different. When excluding the reasons that where same with all of the profiles, gamers in this group played with family or friends for the company (*M*=3.15, *SD*=1.46), to experience success (*M*=3.14, *SD*=1.37) and to pass time (*M*=3.12, *SD*=1.36).

This profile did not specifically enjoy gaming except for exploring and developing the gameworld. They scored above average on factor number 4: Explore and Develop the Gameworld (*M*=0.18, *SE*=0.13). On all other factors they scored below average, scoring just below average on factor number 2 (*M*=-0.22, *SE*=0.14), 1 (*M*=-0.28, *SE*=0.12), 3 (*M*=-0.71, *SE*=0.08), 5 (*M*=-0.20, *SE*=0.12) and 6 (*M*=-0.91, *SE*=0.08). Figure 1 presents the clusters preferences on the six core dynamics.

The Commander profile (cluster 4) consists of male gamers who prefer logic, coordinating, and managing in games. The cluster has 97 participants, which is about 20.73% of the data. The mean age was 30.76 (*SD*=9.20), and one third of the participants in this cluster were Australian. This cluster consisted almost exclusively of males: 97.94% were male. The Finnish participants of this cluster had most likely an undergraduate

degree, and the Australians had a Bachelor's degree. Time used weekly on gaming was 18.93 hours (*SD*=13.93).

Gamers in this cluster scored PC and console games downloaded from a web store (*M*=3.98, *SD*=1.07) and single player computer games (*M*=3.77, *SD*=1.14) the highest, and gave highest scores to action-adventure games (*M*=4.36, *SD*=1.45) and role-playing games (*M*=4.38, *SD*=1.60), but these scores were not significantly different. When excluding the reasons that where same with all of the profiles, gamers in this group played to have challenges and to develop (*M*=3.34, *SD*=1.31).

This group enjoys managing, solving problems, and interacting with other characters in good and in bad. They scored above average on factors 5: Interact (M=0.41, *SE*=0.07); 6: Logic and Problem Solving (*M*=0.43, *SE*=0.08); 1: Assault and Coordinate (*M*=0.19, *SE*=0.08), and 2: Manage (*M*=0.18, *SE*=0.07). They scored below average on factors 3 (*M*=-0.94, *SE*=0.06) and 4 (*M*=-0.31, *SE*=0.10). Figure 1 presents the clusters preferences on the six core dynamics.

The Companion profile (cluster 5) consists mainly of Australian male gamers who played less than gamers on the other clusters. The cluster has 85 participants, which is 18.16% of the respondents. The mean age was 31.99 (*SD*=11.14), making this cluster's average the oldest. This cluster has the biggest frequency of Australians: 45.88% of the gamers in this cluster were Australian. It has 25.88% female players. The Finnish participants of this cluster had most likely done high school, and Australians had a Bachelor's degree. They played 15.52 hours weekly (*SD*=15.52), which is the lowest average of time used weekly on gaming.

Gamers in this cluster scored PC and console games downloaded from a web store (*M*=3.30, *SD*=1.41) highest, and gave highest score to puzzle games, but these scores were not significantly different. When excluding the reasons that where same with all of the profiles, gamers in this group played with family or friends for the company (*M*=3.08, *SD*=1.43).

This profile enjoyed interacting, managing and expressing. They scored over average on factors 3: Affect, Aesthetics and Expression (*M*=0.65, *SE*=0.06); 5: Interact (*M*=0.56, *SE*=0.07); and 2: Manage (*M*=0.11, *SE*=0.08). They scored just below average on factor number 1 (*M*=-0.00, *SE*=0.07), 4 (*M*=-0.61, *SE*=0.07), 6 (*M*=-0.68, *SE*=0.06). Figure 1 presents the clusters preferences on the six core dynamics.

3.3. The psychological experiences of gaming for the different player types

Next, the player groups identified with the cluster analysis were compared in the potential positive subjective experience (in self-efficacy, curiosity, vitality, and empowerment) associated with gaming. The data were analyzed with a repeated measures ANOVA, in which the player group was a between-subjects and the context (real-life vs. gaming) a within-subjects factor.

Though the players had a stronger positive subjective experience on gaming on all of the scales, they did not give low values for real-life experiences. This is presented on Table 4, where it can be seen that averages on every cluster on self-efficacy (minimum = 2.74/4), curiosity (minimum = 2.75/5) and empowerment (minimum = 5.18/7) were over the average and thus on the positive side. The same effect can be seen with vitality in all but cluster 1 (3.37/7).

Experienced self-efficacy was significantly higher during gaming throughout the whole data, $F(1, 463)=47.63$, $p<0.001$. The clusters differed on experienced self-efficacy significantly, $F(4, 463)=16.19$, $p<0.001$. Interaction between cluster and context was significant, $F(4, 463)=2.83$, $p<0.05$, indicating that the difference between real-life and gaming context varied across clusters.

With curiosity, the difference in subjective experience in real-life versus gaming was significant, $F(1, 463)=227.97$, $p<0.001$. The clusters differed on subjective experience of curiosity significantly, $F(4, 463)=14.01$, $p<0.001$. Interaction between cluster and context was significant, $F(4,463)=7.57$ $p<0.001$, indicating that the difference between real-life and gaming context varied across clusters.

Table 4. Cluster differences on psychological scales, comparing subjective reported experience in real life and gaming.

	Cluster	1		2		3		4		5	
		M	SD	M	SD	M	SD	M	SD	M	SD
Real-Life	GSE	2.75	0.49	3.00	0.52	2.84	0.53	3.13	0.43	3.06	0.34
	CEI-II	2.88	0.66	3.10	0.76	2.75	0.77	3.19	0.71	3.22	0.73
	Vitality	3.37	1.36	3.83	1.39	3.56	1.29	3.80	1.20	4.15	1.23
	Empow	5.19	1.09	5.38	1.09	5.18	1.07	5.53	0.99	5.53	0.94
Game	GSE	2.86	0.55	3.29	0.48	2.96	0.70	3.36	0.35	3.16	0.41
	CEI-II	3.49	0.65	3.94	0.70	3.16	0.91	3.81	0.63	3.53	0.66
	Vitality	4.72	1.28	5.23	1.11	4.27	1.41	4.83	1.07	4.46	1.21
	Empow	5.46	0.88	5.76	0.75	5.11	1.31	5.67	0.82	5.28	0.99

Note: GSE scale [1,4], CEI-II scale [1,5], Vitality scale [1,7] and Psychological Empowerment scale [1,7].

Results for subjective vitality were that the difference in subjective experience in real-life versus gaming was significant, $F(1, 463)=211.89$, $p<0.001$. The clusters differed on experienced subjective vitality significantly, $F(4, 463)=5.34$ $p<0.001$. Interaction between cluster and context was significant, $F(4, 463)=9.98$, $p<0.001$, indicating that the difference between real-life and gaming context varied across clusters.

Finally, experienced empowerment did not differ between contexts, $F(1, 463)=2.91$, $p=0.09$. There were differences between clusters, $F(4, 463)=5.06$, $p=0.001$. Moreover, the interaction between cluster and context was significant, $F(4, 463)=4.37$, $p<0.05$, indicating that the difference between real-life and gaming context varied across clusters.

As there were Cluster x Context interactions in all four measures, interaction were followed up with t-tests comparing life and gaming contexts, separately for all of the clusters. Interactions were significant, therefore no correction was used. Figure 2 contains the calculated difference of real-life and gaming perspective, from the four different scales to all of the five clusters.

Players assigned to The Wise Adventurer profile (cluster 1) showed higher curiosity ratings in gaming than in real-life, $t(70)=-7.25$, $p<.001$. They also showed higher ratings of subjective vitality in gaming than in real-life, $t(70)=-8.05$, $p<.001$. Also self-efficacy ($t(70)=-1.71$, $p=0.09$) and psychological empowerment ($t(70)=-1.83$, $p=0.072$) were higher in gaming than in real-life, but the difference failed to reach traditional levels of significance.

Players in The Looter-Adventurer profile (cluster 2) showed higher ratings in gaming than in real-life on all four psychological measures: self-efficacy $t(133)=-6.71$, $p<.001$, curiosity $t(133)=-12.95$, $p<.001$, subjective vitality $t(133)=-11.44$, $p<.001$ and psychological empowerment $t(133)=-4.06$, $p<.001$.

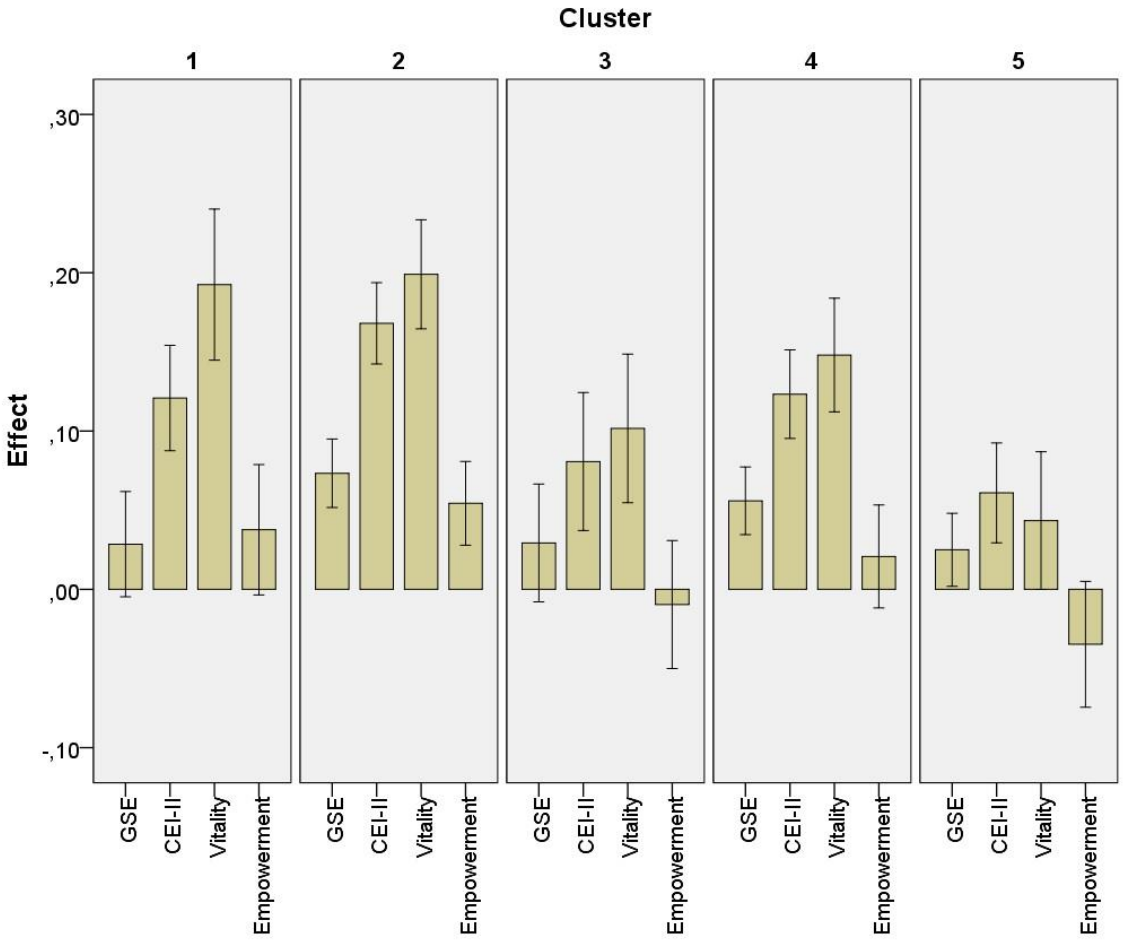
Players assigned to The Explorer profile (cluster 3) showed higher curiosity ratings in gaming than in real-life, $t(80)=-3.69$, $p<.001$. They also showed higher ratings of subjective vitality in gaming than in real-life, $t(80)=-4.31$, $p<.001$. The differences in self-efficacy and psychological empowerment were negligible, self-efficacy having $t(80)=-1.57$, $p=.12$ and psychological empowerment, $t(80)=0.47$, $p=.64$.

Players in The Commander profile (cluster 4) showed higher ratings of self-efficacy in gaming than in real-life, $t(96)=-5.20$, $p<.001$. They also showed higher curiosity ratings in gaming than in real-life, $t(96)=-8.75$, $p<.001$, and higher ratings of subjective vitality in gaming than in real-life, $t(96)=-8.19$, $p<.001$. As for psychological

empowerment, there was practically no difference between gaming and real-life (t(96)=-1.27, p=.21).

Players assigned to The Companion profile (cluster 5) showed higher self-efficacy ratings in gaming than in real-life, t(84)=-2.16, p<.05. They also showed higher ratings of curiosity in gaming than in real-life, t(84)=-3.84, p<.001. Subjective vitality was higher in gaming than in real-life, but the difference failed to reach traditional levels of significance, t(84)=-1.99, p=.05. With psychological empowerment the average was higher on cluster 5 regarding real-life, not gaming, t(84)=1.74, p=.09, although not significantly.

Figure 2. The mean positive subjective experiences (i.e. difference between gaming and real-life) in the four psychological scales, separately for the different clusters. Error bars represent 95% confidence intervals.



4. DISCUSSION

4.1. Game dynamics preferences

This thesis researched the gaming preferences and profiling of gamers, and the correlation of gaming preferences with positive subjective experiences of gaming. Based on the research of Vahlo et al (2017), I expected to find profiles that differ on preferences. Moreover, I expected that the player groups might report different subjective experiences from game play perspective.

This study conducted five player profiles: Wise Adventurer, the Looter-Adventurer, the Explorer, the Commander and the Companion. The Wise Adventurer profile (cluster 1) consists mainly of female gamers, mostly Finnish participants, who enjoy solving problems and exploring. The Looter-Adventurer profile (cluster 2) consists mainly of male gamers who use a lot of time on gaming and generally enjoy a great variety of actions in games. The Explorer profile (cluster 3) does not enjoy any actions other than developing a character and exploring the gameworld. The Commander profile (cluster 4) consists mainly of male gamers who prefer logic, coordinating, and managing in games. Finally, the Companion profile (cluster 5) consists mainly of Australian male gamers who played less than gamers on the other clusters.

These results differ from the ones Vahlo et al (2017) conducted with the same questionnaire (Game Dynamics Preferences Questionnaire). One difference on these profilings is that I have only 5 profile categories, when Vahlo et al (2017) have seven. Based on their data of gamers who played on average 12.54 hours weekly, Vahlo et al (2017) found the following seven player types: the Mercenary (heavy gamers, mostly male who preferred assaulting), the Companion (female who favoured journeying and caring), the Commander (male who liked to manage), the Explorer (players who preferred journeying and quite as much assaulting), the Patterner (light gamers, older female who liked to coordinate), the Solver (light gamers, older female who preferred problem solving) and the Technician (male who favoured racing and combating). Three of Vahlo et al (2017) profiles are close to the ones on this thesis: the Companion, the Commander and the Explorer. Otherwise, it seems that my profiling the Looter-Adventurer could be the combination of Vahlo et al (2017) profiles Mercenary and Technician; and the Wise Adventurer could involve the Patterner and the Solver.

The differences to the Vahlo et al (2017) study might be due to two possible reasons. They might be due to the fact that my data consisted more of heavy gamers, who

played on average 20.16 hours weekly, whereas Vahlo et al (2017) used participants who played a lot less (12.54 hours weekly). The heavy gamers might be more clearly categorizing, because a lot of gaming affects one's preferences to be more exact. Instead, a data consisting of more average gamers might have a lot of variance, and gamers who do not play a lot, might not have as specific preferences. Secondly, they might have been effected with that I had a 50 item questionnaire on the dynamics, which is more than Vahlo et al (2017) had. The added items were thought to be needed based on the earlier article (Vahlo et al, 2017)

4.2. Profiles differ on backgrounds and on psychological experiences when playing

The player groups differ from each other on gender, age, time used on gaming, education and on the positive subjective experience gained from gaming. The Wise Adventurer profile (cluster 1) consists mainly of female gamers, mostly Finnish participants. The Looter-Adventurer profile (cluster 2) consists mainly of male gamers. The Explorer profile (cluster 3) did not differ significantly from other profiles in any background variable. The Commander profile (cluster 4) consists mainly of male gamers, and the Companion profile (cluster 5) consists mainly of Australian male gamers.

The profile which contained heaviest gamers (the Looter-Adventurer), showed significant positive effects of gaming on all of the four psychological measures. These players also spent the most time playing, and a possible reason for why they experience gaming so positively is that the more one plays, the better she gets, and the more enjoyable the activity is.

Both the Wise Adventurers and The Explorers experienced higher curiosity and subjective vitality ratings in gaming than in real-life. The Commander profile showed higher ratings of self-efficacy in gaming than in real-life. They also showed higher curiosity ratings in gaming than in real-life, and higher ratings of subjective vitality in gaming than in real-life. Players assigned to The Companion profile showed higher self-efficacy ratings in gaming than in real-life. They also showed higher ratings of curiosity in gaming than in real-life.

Interestingly, all of the five clusters gained significantly on curiosity. Curiosity is suspected to play a role in the development of intelligence, wisdom, happiness, meaning in life, distress tolerance, and satisfying and engaging social relationships (Kashdan et al, 2009). Kashdan et al. (2009) state that curiosity, especially the embracing aspect, is possibly relevant to the development of psychopathology, for the

intolerance of uncertainty is a risk factor when it comes to anxiety disorder. With curiosity comes tolerance of uncertainty, and thus it might be a protective factor for developing an anxiety disorder. Thus it is a vital factor of psychological wellbeing.

The common research of gaming field shows the concerns of negative effects gaming has on players (Petry et al, 2014; Griffiths et al, 2014; Berle et al, 2015; Andreassen et al, 2016; & Gaetan et al, 2016). This study shows the positive subjective experiences game players have, and help us further understand the growing consumption of digital gaming.

4.3. Limitations of the present study

Next I will discuss the limitations considering the measurements and selected variables, the data and the design of the study.

What should be considered is the fact that participants gave their own estimate on how much time they use on playing per week. It might be difficult to estimate the time spent on gaming accurately – especially if gaming is not performed regularly (i.e. daily) and in stretches that are easy to estimate (e.g. "I play two hours every night before going to bed" vs. "I play a mobile game whenever I have few minutes of spare time"). To have this estimated objectively, it would need to be measured i.e. by having an application that registers the time spent on gaming. Unfortunately this was not possible in the present study, and would have in any case been difficult to put into practice for the sake that games are being played in large variation of platforms (mobile phones, consoles, computers, pads etc.)

Some participants commented on the problems related to the game dynamics preferences questionnaire. Some items contained several different actions, i.e. "stealing valuables, carjacking, breaking into places or hacking systems". This was difficult when e.g. liking one thing on one item, but not the other, so participants had a hard time deciding how to respond to that item. The reason for including several different actions into one item was that they all could be categorized into one more abstract action, e.g. "breaking the law" (Vahlo et al., 2017).

The web survey failed to have tangible wellbeing indicators, in example questions about sleep, eating and exercising habits. These would have been an important addition to the questionnaire, and are highly recommended to be considered in future research.

It is noteworthy that the gender distribution was heavily skewed, for 80 % of the respondents were male. The data also contained a mixture of Australian and Finnish participants. This might make generalizing the results more complicated. The purpose of taking both countries to the data was to compare them, but this was not possible for the frequency of the Australian players was too small. This was due to the fact that it was difficult to gain the trust of the players in gaming forums to click the link to the survey, especially considering female gamers. Also, the participants of this data were more heavy gamers who use web forums to communicate. These players do not represent all players, and might not represent all heavy gamers either, i.e. those who do not use forums.

This study did not contain control groups, which is a significant limitation in interpreting the results. The reasons for positive subjective experience of gaming might not be due to gaming, but to similar effects that in example hobbies and other pastime activities have. Thus it would be important to further study the positive subjective experiences with a non-gamer control group.

The experiences of gaming were asked by a web survey, where participants answered by memorizing gaming situations. To get accurate information on subjective experiences of gaming, it would be important to research during gaming.

Finally, as this is a correlational study, conclusions on causality cannot be made. The results show that certain gaming profiles are associated with higher positive subjective experience from gaming, but these correlations should be further examined to gain understanding on the causal relationships. An important way to study this subject would be a longitudinal research, with a control group. This could be done with a study that would measure positive effects on a long run, i.e. with separated groups of heavy and light gamers. It would also be interesting to see, whether gaming preferences change during time, and if they change, how much.

4.4. Conclusions

These results show the positive subjective experience gamers have. This is important for understanding the growing consumption of digital games. The heavy gamers who participated in this survey reported higher evaluations of self-efficacy, curiosity, subjective vitality and psychological empowerment during gaming than in real-life.

Gamers appear to experience gaming positively. This might be one of the reasons why some gamers play a lot. Then again, it is also possible that gamers who play a lot, experience gaming more positively. All this helps us understand gaming addiction better; players gain positive feelings from gaming.

The positive subjective experiences could further be used for developing a working intervention for players suffering from gaming addiction. Based on this study, interventions endorsing curiosity to other subjects than gaming could be effective.

Game development could go more on point when taking into consideration this kind of profiling of the gamers. These profilings could enlighten the way on how to develop a game to the preferences of players. For example, a game could be developed explicitly for a certain gamer type.

REFERENCES

Andreassen, C. S., Billieux, J., Griffiths, M. D., Kuss, D. J., Demetrovics, Z., Mazzoni, E. & Pallesen, S. (2016). The relationship between addictive use of social media and video games and symptoms of psychiatric disorders: a large-scale cross- sectional study. *Psychology of Addictive Behaviors, 30*(2), 252–262.

Bacher, J., Wenzig, K. & Vogler, M. (2004). Twostep cluster – a first evaluation. *Arbeits- und Diskussionspapiere, 2004-*2*,* 2.

Bandura, A. (1977). *Social learning theory.* Prentice-Hall, Inc., Engelwood Cliffs, N.J.

Bavelier , D., Green, C.S. & Seidenberg , M.S. (2013). Cognitive development: gaming your way out of dyslexia? *Current Biology, 23*(7), 282-283.

Berle, D., Starcevic, V., Porter, G. & Fenech, P. (2015). Are some video games associated with more life interference and psychopathology than others? Comparing massively multiplayer online role-playing games with other forms of video game. *Australian Journal of Psychology, 67,* 105–114.

Brand, J. E., Todhunter, S. & Jervis, J. (2017). *Digital Australia 2018.* Eveleigh, NSW: IGEA.

Chisholm, J. D. & Kingstone, A. (2015). Action video games and improved attentional control: Disentangling selection- and response-based processes. *Psychonomic Bulletin & Review 22,* 1430–1436.

De Grove, F., Cauberghe, V. & Van Looy, J. (2016). Development and Validation of an Instrument for Measuring Individual Motives for Playing Digital Games. *Media Psychology, 19,* 101–125.

Douglas, K. (2012). *Enhancing learning outcomes through evaluation of serious gaming: a mixed methods study.* Ann Arbor, Michigan: ProQuest LLC.

Dugas, M. J., Freeston, M. H. & Ladouceur, R. (1997). Intolerance of uncertainty and problem orientation in worry. *Cognitive Therapy and Research, 21,* 593–606.

Durkin, K. & Barber, B. (2002). Not so doomed: computer game play and positive adolescent development. *Journal of Applied Developmental Psychology 23,* 373–392.

Gaetan S., Bréjard, V. & Bonnet, A. (2016). Video games in adolescence and emotional functioning: Emotion regulation, emotion intensity, emotion expression, and alexithymia. *Computers in Human Behavior, 61,* 344-349.

Granic, I., Lobel A. & Engels R.C.M.E (2014). The Benefits of Playing Video Games. *American Psychologist, 69*(1), 66–78.

Giammarco, E. A., Schneider, T.J., Carswell, J. J. & Knipe, W. S. (2015). Video game preferences and their relation to career interests. *Personality and Individual Differences 73,* 98–104.

Green, C. S. & Bavelier, D. (2007). Action-Video-Game Experience Alters the Spatial Resolution of Vision. *Psychological Science, 18*(1), 88-94.

Green, C. S. & Bavelier, D. (2012). Learning, attentional control, and action video games. *Current biology, 22*(6), 197-206.

Griffiths, M. D., Van Rooij, A. J., Kardefelt-Winther, D., Starcevic, V., Király, O., Pallesen, S., Müller, K., Dreier, M., Carras, M., Prause, N., King, D. L., Aboujaoude, E., Kuss, D. J., Pontes, H. M., Fernandez, O. L., Nagygyorgy, K., Achab, S., Billieux, J., Quandt, T., Carbonell, X., Ferguson, C. J., Hoff, R. A., Derevensky, J., Haagsma, M. C., Delfabbro, P., Coulson, M., Hussain, Z. & Demetrovics, Z. (2014). Working towards an international consensus on criteria for assessing internet gaming disorder: a critical commentary on Petry et al. *Addiction, 111,* 167–178.

Hartanto, A., Toh, W. X. & Yang H. (2018). Context counts: The different implications of weekday and weekend video gaming for academic performance in mathematics, reading, and science. *Computers & Education 120,* 51–63.

Kanter, R. M. (1983). *The Change Masters*. New York, NY: Simon & Schuster.

Kashdan, T. B. (2009). *Curious? Discover the missing ingredient to a fulfilling life.* New York, NY: William Morrow.

Kashdan, T. B., Gallagher, M. W., Silvia, P. J., Winterstein, B. P., Breen, W. E., Terhar, D., & Steger, M. F. (2009). The curiosity and exploration inventory-II: Development, factor structure, and psychometrics. *Journal of Research in Personality, 43*(6), 987-998.

Király, O., Tóth, D., Urbán, R., Demetrovics, Z. & Maraz, A. (2017). Intense Video Gaming Is Not Essentially Problematic. *Psychology of Addictive Behaviors 31*(7), 807–817.

Kostenius, C. & Hertting, K. (2016). Health promoting interactive technology: Finnish, Norwegian, Russian and Swedish students' reflections. *Health Promotion International, 31,* 505–514.

Lee, B. W. & Leeson, P. R. C. (2015). Online Gaming in the Context of Social Anxiety. *Psychology of Addictive Behaviors 29*(2), 473–482.

Liu, C.-C. (2016). Understanding player behavior in online games: The role of gender. *Technological Forecasting & Social Change 111,* 265–274

Mayra, F., Karvinen, J. & Ermi L. (2016). *Pelaajabarometri 2015.* TRIM Research Reports 21.

Nam, T. (2017). Who is dating and gaming online? Categorizing, profiling, and predicting online daters and gamers. *Computers in Human Behavior 73*, 152-160.

Petry, N. M., Rehbein, F., Gentile, D. A., Lemmens, J. S., Rumpf, H-J., Mößle, T., Bischof, G., Tao, R., Fung, D. S. S., Borges, G., Auriacombe, M., Ibáñez, A. G., Tam, P. & O'Brien, C. P. (2014). An international consensus for assessing internet gaming disorder using the new DSM-5 approach. *Addiction, 109,* 1399–1406.

Rehbein, F., Staudt, A., Hanslmaier, M. & Kliem, S. (2016). Video game playing in the general adult population of Germany: Can higher gaming time of males be explained by gender specific genre preferences? *Computers in Human Behavior 55,* 729–735.

Renninger, K. A., Hidi, S. & Krapp, A. (1992). *The role of interest in learning and development.* Hillsdale, NJ: Erlbaum.

Rieger, D., Frischlich, L., Wulf, T., Bente G. & Kneer, J. (2015). Eating ghosts: The underlying mechanisms of mood repair via interactive and noninteractive media. *Psychology of Popular Media Culture, 4*(2), 138–154.

Ryan, R. M. & Frederick, C. (1997). On energy, personality, and health: Subjective vitality as a dynamic reflection of well-being. *Journal of Personality, 65,* 529-565.

Silvia, P. J. (2006). *Exploring the psychology of interest.* New York: Oxford University Press.

Schwarzer, R. (Ed.) (1992). *Self-efficacy: Thought control of action.* Washington, DC: Hemisphere.

Schwarzer, R., & Jerusalem, M. (1995). Generalized Self-Efficacy scale. In J. Weinman, S. Wright, & M. Johnston. Measures in health psychology: A user's portfolio. *Causal and Control Beliefs,* 35-37.

Spreitzer, G. M. (1995). Psychological empowerment in the workplace: Dimensions, measurement, and validation. *Academy of Management Journal, 38,* 1442-1465.

Thomas, K. W., & Velthouse, B. A. (1990). Cognitive elements of empowerment. *Academy of Management Review,* 15, 666-681.

Vahlo, J., Kaakinen, J. K., Holm, S. K., & Koponen, A. (2017). Digital game dynamics preferences and player types. *Journal of Computer-Mediated Communication, 22*(2), 88-103.

Weger, U. W. & Loughnan, S. (2014). Virtually numbed: Immersive video gaming alters real-life experience. *Psychonomic Bulletin & Review, 21,* 562–565.

Weger, U. W., Loughnan, S., Sharma, D. & Gonidis, L. (2015). Virtually compliant: Immersive video gaming increases conformity to false computer judgments. *Psychonomic Bulletin & Review, 22*, 1111–1116.

Westrom, M. & Shaban, A. (2014*).* Intrinsic motivation in microcomputer games. *Journal of Research on Computing in Education. 24*(4), 433-446.

Wouters, P., van Oostendorp, H., Boonekamp, R. & van der Spek, E. (2011). The role of Game Discourse Analysis and curiosity in creating engaging and effective serious games by implementing a back story and foreshadowing. *Interacting with Computers, 23,* 329–336.

Yee, N. (2006). The demographics, motivations, and derived experiences of users of massively multi-user online graphical environments. *Presence, 15*(3), 309–329.

Zajac, K., Ginley, M. K., Chang, R. & Petry, N. M. (2017). Treatments for Internet Gaming Disorder and Internet Addiction: A Systematic Review. *Psychology of Addictive Behaviors 31*(8), 979–994

APPENDIX

Appendix A

Forums

- atomicmpc.com.au
- ausforces.com
- aussiearcade.com
- bigfooty.com
- boomerang-gaming.com
- broniesaustralia.com.au
- cybergamer.com
- dubbrothers.net
- dying2kill.com.au
- enjin.com
- gametracker.com
- gpforums.net
- hotcopper.com.au
- macworld.com.au
- mmgn.com
- onlineopinion.com.au
- ozgaming.com.au
- pcpowerplay.com.au
- pomsinoz.com
- raisingchildren.net.au
- retrocollect.com
- robertsspaceindustries.com
- streetgeek.com.au
- tacticalgaming.net
- theharlequin.com.au
- theoldergamers.com
- tsumea.com
- wargamerau.com

Appendix B

Table 1 Game dynamics preferences items' means, standard deviations and factor loadings (loadings <.30 are not presented for the sake of clarity).

			Factor					
	M	SD	1	2	3	4	5	6
Piloting or maneuvering a vehicle or a character or tilting the game environment skillfully	3.79	1.04	0.54					
Careful aiming and hitting the target	3.74	1.02	0.54					
Close-combat by using fighting techniques and by performing combo attacks	3.16	1.18	0.43					
Jumping from a platform to another while avoiding obstacles	3.15	1.06	0.39					
Hiding or fleeing and surviving by running for your life	3.35	1.13	0.55					
Exploding, demolishing, crashing and destroying	3.66	1.03	0.58					
Racing in a high speed	3.32	1.16	0.68					
Performing in lifelike sports such as basketball, ice hockey, or soccer	2.45	1.30	0.35					
Killing, murdering or assassinating by shooting, using blades or by other weapons	3.69	1.05	0.62				0.32	
Stealing valuables, carjacking, breaking into places or hacking systems	3.42	0.99	0.55				0.34	
Sneaking, laying traps and stealth	3.81	1.00	0.56					
Firing enemies and avoiding enemy fire in a high speed	3.44	1.13	0.72					
Building, expanding and developing a city, a village, or a base	3.71	1.02		0.72				
Managing cities, villages or castles and its inhabitants and resources	3.51	1.10		0.82				
Designing and creating your own game levels or gameworlds	2.97	1.11		0.32				
Gathering or generating materials or resources like money, energy or food by working	3.38	1.01		0.58		0.37		
Waging war and conquering territories or cities, choosing troops and commanding units	3.54	1.17	0.39	0.66				
Considering a strategy, estimating probabilities and choosing the best resources	3.73	1.11		0.70				
Planning and conducting combat tactics or other tactics as the battle unfolds	3.69	1.07	0.39	0.63				
Manufacturing, constructing and upgrading vehicles, units or weaponry	3.60	1.02	0.34	0.68				

	M	SD	1	2	3	4	5	6
Guiding, protecting, developing and herding population, people, followers or a brood	3.36	1.07		0.73				
Flirting and dating or hugging and kissing	2.52	1.14			0.63			
Decorating rooms or houses	2.76	1.15			0.60			
Performing music, singing in tune or dancing	2.30	1.20			0.58			
Choosing styles and looks, including dress up and make up	2.75	1.22			0.53			
Staying in the rhythm and moving to the beat	2.40	1.11			0.58			
Having affairs and sex	2.57	1.19			0.49			
Engaging with lifelike social interactions: going to school, shopping, or hanging out with friends	2.37	1.07			0.61			
Crafting new items, weapons or objects by combining ingredients or materials	3.44	1.07				0.55		
Selecting and equipping weapons, skills, and abilities for characters	3.99	0.94				0.60		
Navigating in dungeons and overcoming its dangers	3.72	0.96				0.47		
Creating your own playable character	4.22	0.93				0.55	0.41	
Developing a character's skills and abilities	4.22	0.87				0.68	0.34	
Searching and collecting rare treasures, items, characters or weapons hidden in the game	3.83	1.01				0.65		
Exploring the gameworld, visiting towns, cities and areas, and finding hidden places	4.27	0.81				0.49	0.33	
Fighting by attacking, defending, using spells or by using items and skills	3.98	0.94	0.35	0.31		0.45		
Buying, selling and trading items, weapons, gears and resources	3.57	0.96		0.34		0.50		
Negotiating and conducting diplomacy to find a beneficial agreement	3.45	1.07		0.33			0.45	
Acting as the main character and making meaningful choices that effect the game	4.30	0.89				0.33	0.61	
Befriending with in-game characters, interacting with them and aiding them if in trouble	3.92	1.02			0.31	0.38	0.61	
Empathizing with game characters and taking different roles	3.60	1.09			0.40		0.60	
Investigating and interacting to unveil secrets, mysteries and the story of the game	4.10	0.89					0.55	0.33
Pondering and solving puzzles that require spatial perception	3.49	1.03						0.60

Pondering and solving word puzzles and challenges	3.17	1.08						0.56
	M	SD	1	2	3	4	5	6
Matching tiles, diamonds or other objects together to clear them away	2.69	1.10			0.39			0.40
Pondering and solving logical and mathematical problems and challenges	3.26	1.11						0.75
Memorising and solving memory-based challenges	2.85	1.04						0.58
Solving problems by pondering and realising cause-effect relationships	3.86	0.91					0.33	0.54

- Note. Factor 1 = Assault and Coordinate, Factor 2 =Manage, Factor 3 = Affect, Aesthetics and Expression, Factor 4 = Explore and Develop the Gameworld, Factor 5 = Interact and Factor 6 = Logic and Problem Solving.

Appendix C

Schooling levels

1 Less than Year 12 or equivalent

2 Year 12 or equivalent (HSC/Leaving certificate)

3 Vocational Qualification

4 Associate diploma / Undergraduate diploma

5 Bachelor's Degree (including honors)

6 Master's Degree / PhD or other postgraduate education

1 Peruskoulu (~Less than year 9)

2 Ammattikoulu/muu vastaava toisen asteen tutkinto (~Vocational Qualifications)

3 Lukio (=Year 12 or equivalent)

4 Alempi korkeakoulututkinto (= Bachelor's Degree)

5 Ylempi korkeakoulututkinto (=Master's Degree)