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The relationship between video game play time, feelings of engagement,  
competence, and relatedness with happiness

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## **Declaration**

I declare that this submission is my own work. Where I have read, consulted, and used the work of others I have acknowledged this in the text

Signed: Ciaran Byrne

Date: 29<sup>th</sup> March 2023

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## **Abstract**

The present study investigated the relationships between video game play time (hours per week), feelings of engagement, competence, and relatedness with happiness among individuals who play video games at least once a week. The online questionnaires were completed fully by 92 participants while remembering a regular gaming experience for them. The Game Engagement Questionnaire (GEQ), Player Experience Needs Satisfaction (PENS) scale, and the Oxford Happiness Questionnaire (OHQ) were used to test participants. The results indicated that feelings of engagement and relatedness were not predictors of happiness. However, more hours playing video games per week had a negative relationship with happiness. High competence was also a significant predictor of happiness. The implications of the present study indicates that feelings of competency could be a motivating factor for people who play video games and have an increase in happiness. This study also showcases that too many hours played per week could have an adverse effect on happiness.

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## *Introduction*

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## **1.1 Video Games**

Video gaming has become one of the fastest-growing industries in the last 40 years. According to Muriel and Crawford, (2018) video games have only been more relevant in culture in the last decade because of the exponential growth of gamers around the world with more than 3 billion active gamers around the world (Statista, 2022). With the increase in popularity of video games, there are more players than ever, and it raises the question, how does it affect wellbeing?

It is important to distinguish video games from other forms of media. Granic et al (2014) have said that the defining feature of the video games we play is that they are interactive. Players cannot coast through the game by passively engaging with the storyline, they must take control and play through it themselves. These games can be played by yourself or cooperatively, with another person in the room, or with tens of thousands of online players.

Video game research for the last three decades or so has been very focused on the possible links between video games and aggression, violence, and addiction. Many studies have brought us nowhere near a conclusive answer as finding reliable, replicable, and ecologically valid research is a rarity (Drummond et al., 2020; Elson & Ferguson, 2014). Research on the positive side of video games has begun to emerge.

## **1.2 Well-being/ Happiness**

Well-being has become an exciting field in psychology since Ed Diener's emerging model in 1984. The model has three aspects for subjective well-being, positive affect, life satisfaction, and happiness (Diener, 1984; Diener et al., 2018). Røysamb and Nes (2018) discuss the role of genetics in the experience of subjective well-being and attribute 30-40% of the variance in individual differences in subjective well-being variance to genetics. This leaves another 60-70% of our well-being up to environmental factors that we can influence. There are many ways we can use this information to try to optimise our well-being as much as we can, one thing we have control over is how to spend our leisure time. One reason leisure activities impact well-being is because of their

two main defining psychological features, perceived freedom and intrinsic motivations (Csikszentmihalyi & Graef, 1980; Graef et al., 1983). Thus, Participation in activities that are both intrinsically motivating and give a sense of control should increase well-being (Deci & Ryan, 1987).

Happiness has been described by Diener (1984) as a state involving frequent positive emotions, infrequent negative emotions, and high life satisfaction. Seligman (2012) has also suggested that happiness is a combination of meaning, accomplishment, engagement, and relationships. All of which could be satisfied by playing video games. Barr and Copeland-Stewart (2021) conducted a qualitative analysis to look at how the Covid pandemic impacted gaming habits and what that meant for participants' well-being and happiness. They found that video games had a positive effect on the player's perceived well-being with the data that was coded as positive being present ten times more than negative in the 781 participants. So why is it that people play games and can their motivations for gameplay be explained?

### **1.3 Self-Determination-Theory**

According to Skinner (1953), the operant theory suggested that all behavior is motivated by reward and punishment. Behavior that is rewarded will be reinforced and strengthened and behavior that is punished will be discouraged and extinguished. This is the foundation of motivation theory. Self Determination Theory (SDT) is a theory that emerged in the 1980s and focuses on an individual's ability to have choices, make decisions, and manage one's own life (Deci & Ryan, 1985, 2000). Self-determination theory is a macro theory of human motivation, growth, and well-being. SDT focuses on the factors that push motivation, both intrinsic and extrinsic.

In SDT, intrinsic motivation is the core type of motivation in other leisure activities such as play and sports (Frederick & Ryan, 1993, 1995). It would then follow that the drive for playing video games would be intrinsically motivated. According to the SDT, there are three basic psychological needs, autonomy, competence, and relatedness.

Autonomy refers to a person's ability to act on their own accord and their willingness to complete a task. In most cases participation in video games is voluntary and autonomy would usually be high anyway and was thus chosen not to be investigated in the present study. (Ryan et al., 2006)

Competence is the need for challenge and a feeling of effectiveness. Factors that can enhance the feeling of competence can be the opportunity to acquire new skills, be adequately challenged, and receive positive feedback, which can in turn increase intrinsic motivation. Perceived competence would then be found to increase when the controls are readily mastered and there is an adequate challenge. (Deci & Ryan, 1985, 2000). Bopp et al. (2016) did a qualitative study looking at the experiences of those who play video games, they used the PENS scale to review participants feelings of competence. They found that experiencing competence while playing a game was linked to higher enjoyment. This enjoyment could have a positive effect on the participants' happiness. Johannes et al. (2021) looked at the relationship between competence on predicting participants' well-being. It was found that competence was a positive predictor of well-being.

Relatedness is having a sense of belonging and connection to others. Relatedness could be satisfied in multiplayer games where there are interactions between other players and the motivational and well-being benefits associated. (Ryan et al., 2006). Barr and Copeland- Stewart (2021) did a qualitative study of video gamers and their relationships that have been formed and maintained over social games. Barr and Copeland found that these social aspects of games help to keep people engaged in a community and often positively impacted the well-being of participants and motivated them to keep playing. Research suggests that relatedness is the most important aspect of multiplayer but that may not explain those who play single-player games. Some findings could be attributed to the social aspect of games which has been known to improve well-being (Keyes, 1998). Competence as a factor of SDT is a stronger contributor to motivation than autonomy or relatedness for some (Uysal & Yildirim, 2016).

One of the mini theories of SDT is called the *basic psychological needs theory* (BPN). The BPN still uses the three primary needs underlying the SDT, autonomy,

competence, and relatedness which describes the experience of volition, effectiveness, and social interaction that enhances needs satisfaction and in turn, enhances well-being. (Deci & Ryan, 2000). Niemiec et al. (2009) and Sheldon and Elliot (1999) also showed that increases in need satisfaction also led to an increase in well-being which is present in video games. These findings suggest that positive leisure activities may improve people's well-being by increasing their needs satisfaction.

So, if feelings of competence and relatedness contribute to why one would play video games, is there an experience not discussed that takes place during active gameplay?

#### **1.4 Flow**

Flow is a positive state of deep concentration where an activity is so engaging that all else becomes oblivious to the person experiencing flow (Csikszentmihalyi, 1990). It is characterised as a state of intense focus and concentration, loss of sense of self, and time distortions that occur when there is an optimal balance between challenge and skill. People experience flow in a multitude of facets of life, both leisure and professional. Including, but not limited to, dancing, sports, creation of art, performing surgery, and playing video games (Hoffman & Novak, 2009)

Csikszentmihalyi discusses four parameters that induce a flow state which can be found in video games. (1) Video games have concrete goals with reasonable rules. (2) Can provide actions and opportunities to make decisions and the ability to adjust to users' skill levels and capabilities. (3) Often give feedback systems to indicate to the player how good they are doing (eg, leaderboards, number of collectibles, or progress reports). (4) Video games have plenty of multimodal stimulation (visual, aural) that keeps attention and facilitates focus. (Csikszentmihalyi, 1993) Flow is one of the most universally accepted kinds of engagement interaction with a video game (Brockmyer et al., 2009). Chiang et al. (2011) undertook two studies investigating the effect of flow on those who play both violent and non-violent video games. They found a significant relationship between flow and positive affect, regardless of if there was violence present or not in the video games.

Hull et al. (2013) have done a study looking at video game characteristics, flow, and happiness as predictors for video game addiction. This was a survey design of 110 participants looking to gain insight into the potential predictors of video game addiction. Although time distortions are an aspect of flow, Hull et al. (2013) found that time distortions were a strong predictor of addiction and low happiness. This could mean that those who spend more time per week playing video games may experience more time distortions and in turn, lower happiness

A study by Jin (2012) looked at the effects of performance and participants' feelings of competence and flow in medical simulation games and shooting games. It was found that good performance and feelings of competency are positive predictors of flow which echoes back to SDT. In another study done by Laffan et al. (2016), they investigated the relationships between structural video game characteristics, engagement with the video game, and happiness among those who play video games. Participants were asked to think about their favorite game while answering a game engagement questionnaire. The results found that most of the participants' favorite games reported prominent features such as losing a life, high scores, checkpoints, and restarting a level. It was explained that these features, particularly the punishment features, test the player and encourage higher concentration, which can in turn induce a state of flow. Findings interestingly indicated that flow and happiness were negatively correlated which could be that a long-term flow state could lead to frustration. This study did not look at any potential motivators for playing and only on self-reports of players' engagement.

## **1.5 The Current Study**

This current study hopes to investigate the relationship between hours of video game play per week with a focus on feelings of competency and relatedness, video game engagement, and happiness among those who play video games.

RQ: Do hours of video games play per week and feelings of engagement, competency, and relatedness have a relationship with happiness?

Hypothesis 1: There is a significant relationship between hours of video game play per week, feelings of engagement, competence, and relatedness with happiness.

Hypothesis 2: There is a significant relationship between hours of video game play per week with happiness.

Hypothesis 3: There is a significant relationship between feelings of engagement with happiness.

Hypothesis 4: There is a significant relationship between feelings of competence with happiness.

Hypothesis 5: There is a significant relationship between feelings of relatedness with happiness.

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## *Method*

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## **2.1 Design**

The present study employed a quantitative, correlational, within-groups design using an online questionnaire created using Microsoft forms. A multiple regression was used to investigate if there was a relationship between the dependent variable, happiness, and the independent variables. The independent variables are competency, relatedness, engagement, and play time per week in hours.

## **2.2 Participants**

Participants were recruited via an online survey. Many of the participants were recruited around the IADT campus, the rest were recruited through social media posts, and snowball sampling was observed. There were 116 responses to the survey, 1 participants were excluded for not completing the survey and 3 were removed for being outliers. There was a purposive sampling method used for selecting participants. Only participants who played video games at least once a week were used in the study which excluded a further 20 participants. Therefore, 92 participants fully participated in the present study. There were 48 men, 34 women, and 10 self-identifying. The average age of a participant was 22.3 years ( $SD = 2.75$ ) and the age range was from 18-34 years. The treatment of participants was in accordance with the ethical standards of the Psychological Society of Ireland and the Psychology Ethics Committee (PEC) approved the study (Appendix A).

## **2.3 Materials**

The survey was constructed on Microsoft Forms. The participants were shown an information sheet (Appendix B) which contained information about what will be involved in the study and how their data will be protected. After this, an online consent form was used to gain informed consent prior to participants completing the survey (Appendix C).

A demographic information form (Appendix D) was given to collect data about participants, age, gender, how often they play video games per week, and how many hours the participants estimate they play per week. There was also a formula (Initials of

their first and last name and the last three digits of their phone number) for participants to create an anonymised code if they wanted to have their data removed.

### **Game Engagement Questionnaire (GEQ) (Appendix E)**

The Game Engagement Questionnaire (GEQ) is a 19-item questionnaire used to self-assess video game experiences (Brockmyer et al, 2009) The GEQ assesses four known gaming experiences: flow, psychological absorption, presence, and immersion. An example statement on the GEQ is “I lose track of time”, and responses range from “Yes” to “No” on a 5-point Likert scale. Cronbach’s alpha for the current 19-item version of the GEQ had good reliability at .85.

### **Player Experience Needs Satisfaction Scale (PENS) (Appendix F)**

The Player Experience Needs Satisfaction Scale (PENS) is a five-item subscale used to self-assess five different aspects of the video game experience (Autonomy, Competence, Relatedness, Intuitive controls, and presence) (Rigby & Ryan, 2007). Only the competence and relatedness subscales were used in the present study with each of the two subscales comprised of three questions. An example statement is “I feel competent at the game” and answered on a seven-point Likert scale ranging from “Strongly Disagree” to “Strongly Agree” The Cronbach Alpha for the PENS scale is excellent at .93 (Rigby & Ryan, 2007). Competence had a good score of .84 while relatedness had a poor score of .58. (Appendix G)

### **Oxford Happiness Questionnaire (See Appendix H)**

The Oxford Happiness Questionnaire (OHQ) is a 29-item measurement of general happiness (Hills & Argyle, 2002). The OHQ is scored on a six-point Likert scale. Twelve items are scored in reverse (such as ‘I am not particularly optimistic about the future’) and 17 items are scored normally (such as ‘I find most things amusing’). Higher scores indicated higher levels of general happiness and lower scores indicate lower levels of general happiness. (Hills & Argyle, 2002) The Cronbach Alpha value is excellent at 0.91.

## **Debrief Form**

Final confirmation of consent to use their data was shown (See Appendix I). A debrief form (See Appendix J) was provided upon completion of the survey that contained contact information for myself and the supervisor of the present study if the participant retroactively wanted to remove themselves from the study. There is a procedure in place for that. The debrief form also contained information about how the participant's data will be protected and the right to withdraw by the 19<sup>th</sup> of March. Participants were provided support services if affected by the content or study.

A pilot was conducted to identify any problems that would negatively impact the study and the participants experience (N=6). Minor changes were made such as small formatting changes for demographic questions and the estimated time for completion.

## **2.4 Procedure**

Participants clicked on the link to a Microsoft Forms via social media or by QR code if recruited in person on the IADT campus, at a time of their convenience. Initially, participants were shown the information sheet which contained the objective of the study and provided confirmation of consent. Following consent, participants were shown the demographic information form to provide a unique personal ID code for withdrawal from the study, if they so wish in the future. The participants were also asked questions on their frequency of game play per week and how many hours the participants play a week. Next, participants were asked to complete the Game Engagement Questionnaire (GEQ) while thinking about a regular video game session. Participants were asked to complete the Player Experience Needs Satisfaction Scale (PENS) scale while thinking about the last time they were engaged in a video game. Lastly, the participants were asked to complete the Oxford Happiness Questionnaire (OHQ). After participants completed the study, they were thanked for their participation, shown a debrief form that described the withdrawal procedure and given the researcher's contact details, and lastly, supplied with relevant support services.

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# *Results*

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## **3.1 Overview of Results**

The factor variables of the present study were

- (i) hours played per week
- (ii) Engagement
- (iii) Competence
- (iv) Relatedness

The target variable for the present study was happiness. A standard linear multiple regression was conducted using the Statistical Package for Social Sciences (SPSS) IBM version 28.

### 3.2 Descriptive Statistics

There were 116 participant responses (N=116) in the original data. 1 participant was excluded for not completing the questionnaire. 3 participants were removed as they were outliers. 20 were removed due to the purposive sampling methods used. Therefore, 92 participants were included in this study. The N, mean and standard deviation is displayed in Table 1 below.

**Table 1**

*Descriptive Statistics illustrating the means, standard deviations, and n-values for each variable.*

	<i>Mean</i>	<i>Standard Deviation</i>	<i>N</i>
Happiness	4.00	.67	92
HoursPerWeek	11.58	8.54	92
Engagement	3.29	.55	92
Competence	4.44	1.26	92
Relatedness	5.75	.92	92

### 3.3 Inferential Statistics

## **Assumptions**

The preliminary analysis took place to check that all the assumptions for a standard linear multiple regression had been met. The assumption of singularity was met as there were no strong correlations between the predictor variables (Appendix K)

An analysis of standard residuals was carried out on the data to identify any outliers, which indicated that 3 participants needed to be removed. After their removal, an analysis of standard residuals was carried out on the data again and received these values (Std. Residual Min = -3.24, Std. Residual Max = 2.39). The assumption has not been violated (See Appendix L For SPSS Output)

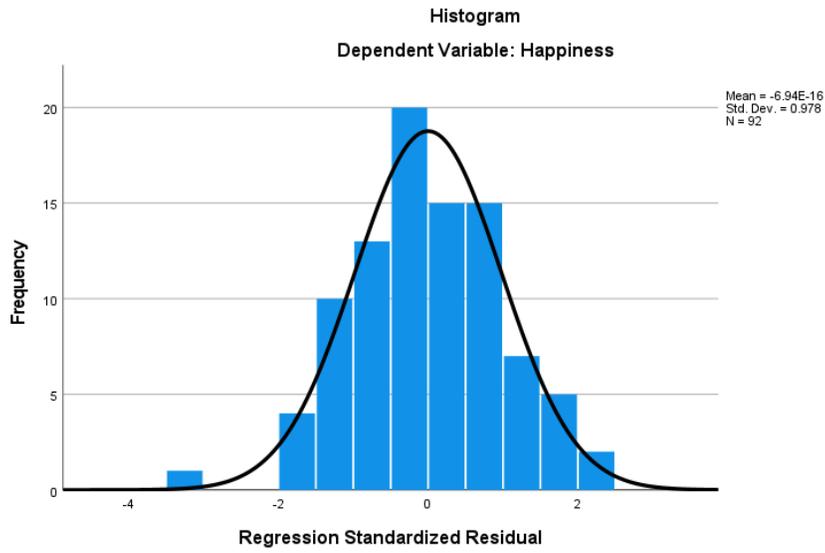
Tests to see if the data met the assumption of collinearity indicated that collinearity was met with all tolerance values above .7 (See Appendix L For SPSS Output). The data met the assumption of independent errors (Durbin-Watson value = 1.97).

Figure 1 displays a histogram and Figure 2 displays a p-plot of standardised residuals which illustrates the assumption of normal distribution.

The scatterplot of standardised residuals showed that the data met the assumptions of homogeneity of variance and linearity. (Figure 3)

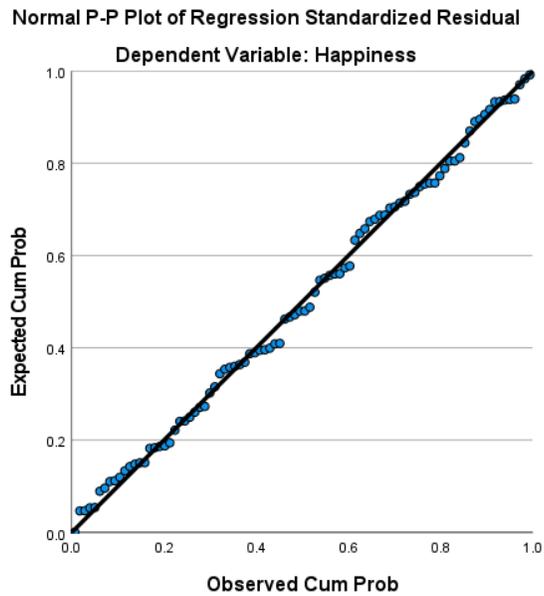
### **Figure 1**

*Histogram displaying normal distribution for the target variable.*



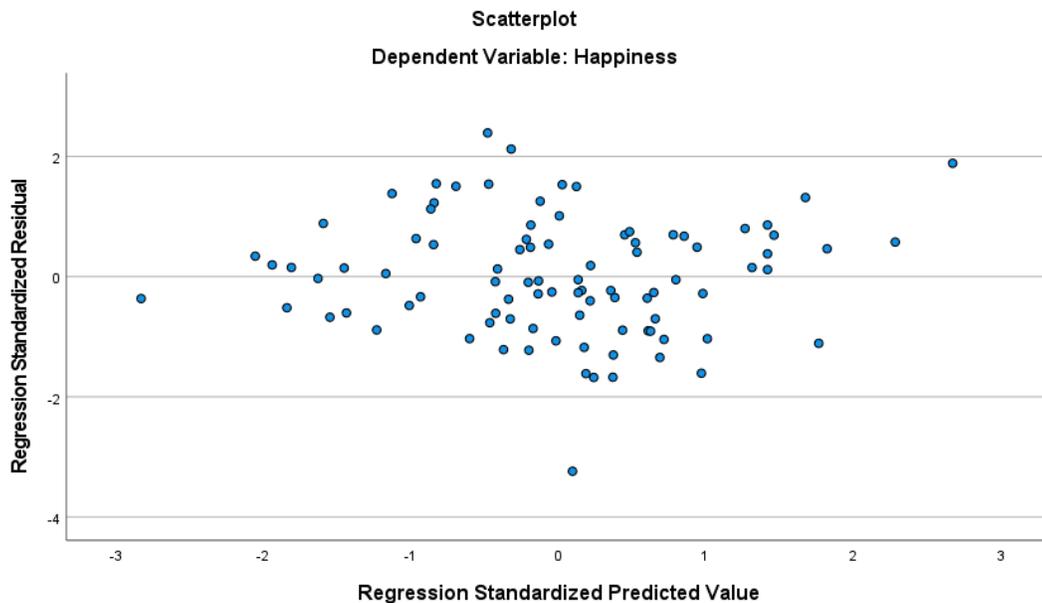
**Figure 2**

*P*-plot illustrating normal distribution.



**Figure 3**

*Scatterplot of standardised residuals showing the assumption of homogeneity of variance and linearity to be met*



The data also met the assumption of non-zero variances (HoursPerWeek, Variance = 72.91; Engagement, Variance = .306; Competence, Variance = .86; Relatedness, Variance = 1.60; Happiness, Variance = .45).

### **Multiple Regression**

A standard linear multiple regression was conducted using the enter method was not significant but was trending toward significance. ( $F(4, 87) = 2.44, p < .053, R^2 = .32, R^2 \text{ Adjusted} = .06$ ). (See Appendix N For SPSS Output)

The analysis shows that engagement and relatedness did not significantly predict happiness, engagement ( $\beta = .09, t(4,87) = .868, p = .388$ ),

relatedness ( $\beta = .029, t(4,87) = 0.05, p = .792$ ).

However, hours played per week level did significantly predict happiness as did feelings of competence

hours played per week ( $\beta = -.24, t(4,87) = -2.03, p < .046$ )

competence ( $\beta = .257, t(4,87) = 2.38, p < .019$ ).

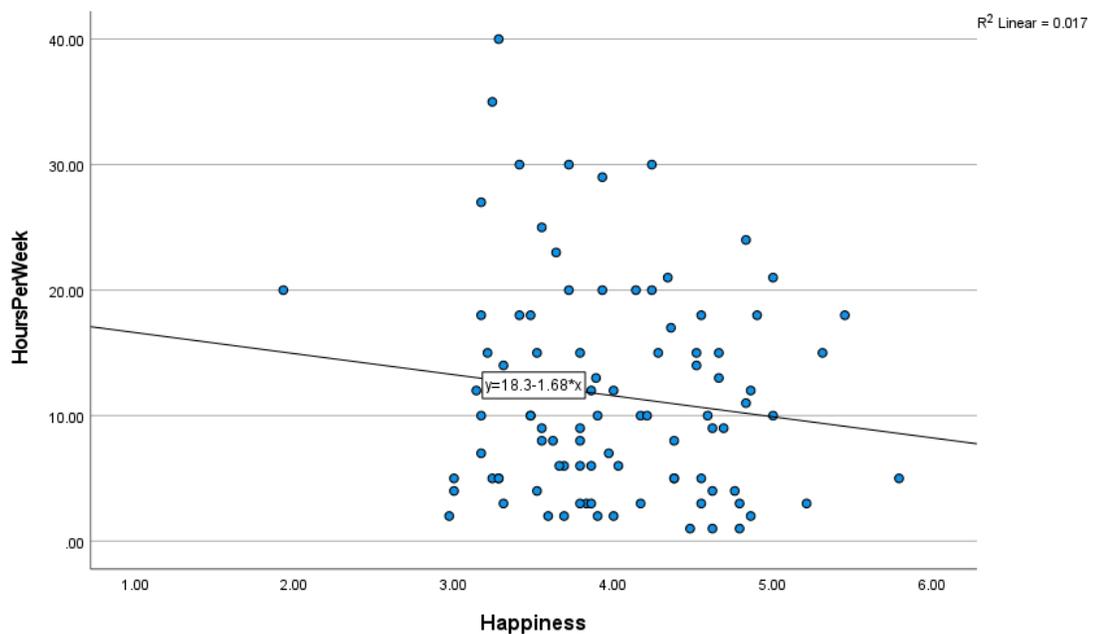
### Summary of results

Hypothesis 1 states that there would be a significant linear relationship between hours of video game play per week, feelings of engagement, competence, and relatedness with happiness. Hypothesis 1 was not supported but was trending towards significance. ( $F(4, 87) = 2.44, p < .053, R^2 = .32, R^2 \text{ Adjusted} = .06$ ).

Hypothesis 2 states that there would be a significant linear relationship between hours of video game play per week with happiness. Hours per week did have a significant relationship with happiness ( $\beta = -.24, t(4,87) = -2.03, p < .046$ ). A Pearson correlation reported that there was a weak negative correlation of  $-.131$  (See Figure 4) between hours of game play per week and happiness. Therefore, Hypotheses 2 was supported.

**Figure 4**

#### *Pearson Correlation between Happiness and Hours per week*

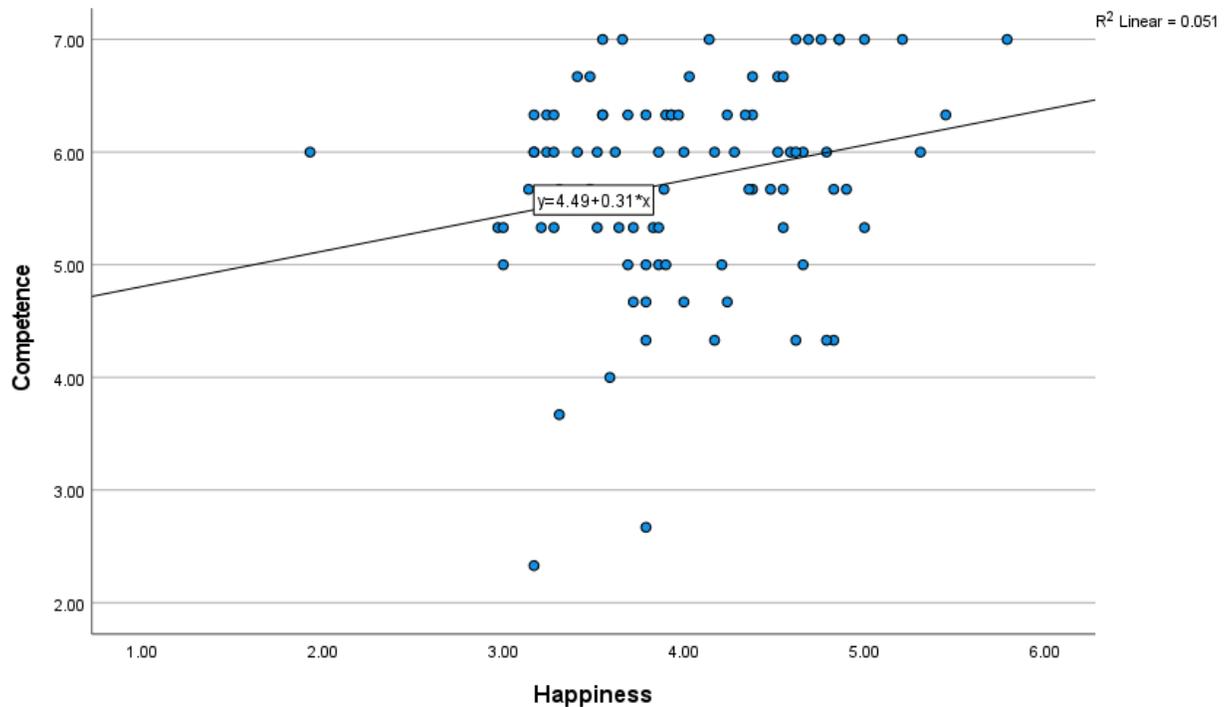


Hypothesis 3 states that there would be a significant linear relationship between feelings of engagement on happiness. There was no significant relationship found ( $\beta = .09, t(4,87) = .868, p = .388$ ). Therefore, Hypothesis 3 is rejected. [\(include plot\)](#)

Hypothesis 4 states that there would be a significant linear relationship between feelings of competence on happiness. It was found that there is a significant relationship between competence and happiness ( $\beta = .257, t(4,87) = 2.38, p < .019$ ). A Pearson correlation found a weak? positive correlation, .227. (See Figure 5) Therefore, Hypothesis 4 is supported.

**Figure 5**

*Pearson correlation between Happiness and competence*



Hypothesis 5 states that there would be a significant linear relationship between feelings of relatedness on happiness. There was no significant relationship found ( $\beta = .029, t(4,87) = 0.05, p = .792$ ). Therefore, Hypothesis 5 is rejected.

The results from the present study will be discussed in more detail in the next section.

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# *Discussion*

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## **4.1 Overview of findings**

This current study aimed to investigate the relationship between hours of video game play per week, feelings of engagement, competence, and relatedness with happiness.

The results showed that hours of video game play per week, feelings of engagement, competence, and relatedness was not a significant predictor of happiness but was trending towards significance ( $p < .053$ ). The present study also discovered that feelings of engagement and relatedness were not significant predictors of happiness.

There were two significant results found. Firstly, hours played per week had a weak and negative relationship with happiness. Secondly, feelings of competence were a significant predictor of happiness.

#### **4.2 Findings**

This study found no significant relationship between hours of video game play per week, feelings of engagement, competence, and relatedness with happiness. While no studies were looking at the exact variables used in the present study, Laffan et al. (2016) used the GEQ and OHQ in their study to investigate the relationships between video game characteristics, engagement, and happiness. The findings from that study indicated that flow and happiness were negatively and weakly related. Chiang et al. (2011) undertook two studies investigating the effects of flow and positive affect and found a significant relationship between the two variables in both studies. The results support the results from Chiang et al. (2011), with the present study finding a weak positive correlation between engagement and happiness.

The results showed that more hours played per week had a negatively weak correlation with happiness. Those who played a high amount of hours per week may have experienced time distortions. In a study by Hull et al. (2013), which looked at video game addiction, found that time distortion was a significant predictor of gaming addiction and low happiness. The results from Hull et al. (2013) could explain why higher hours played per week had a negative relationship with happiness.

There was a significant relationship between competence and happiness and had a weak positive correlation. There was an expectation that feelings of competence would be quite high, seeing as the present study only asked people who play games once a week so the participants should be familiar with the mechanics of video gaming. Johannes et al. (2021) used the PENS scale in their quantitative study and found that competence was a positive predictor of well-being, this result echoes the result found in the present study. This result was also found in a qualitative study done by Bopp et al. (2016). The current study supported both of these studies.

Lastly, the present study found no significant relationship between relatedness and happiness. The lack of significance between relatedness and happiness is an unexpected result as the power of the social aspects of games and the benefits they bring have been documented (Barr & Copeland Stewart, 2021). This is likely due to the quality of the questions. The present study only contained 3 questions on relatedness. This is certainly a limitation that will be discussed later.

### **4.3 Theoretical and Practical Implications**

Flow theory (Csikszentmihalyi, 1990) has been used to describe the state of intense focus and deep concentration in an activity. Although engagement did not have a significant relationship with happiness, engagement did have a weak positive correlation of .127. This is in line with previous research on flow, which has been shown to have positive effects on those who experience it while playing video games (Chiang et al., 2011). It was found in this study that there was a negative correlation between hours played per week and happiness. This finding aligned with previous research as one aspect of flow is time distortions. Hull et al. (2013) have found that time distortions was a strong predictor of video game addiction and low happiness.

These findings build upon existing literature and expand the research around flow theory. Through flow theory, it is recognised that engagement is important when concentrating on an activity. As the results show, flow theory can have a negative effect on happiness if

someone spends extended time playing video games. The time distortions experience by the flow state can predict unhappiness.

From Self Determination Theory (Deci & Ryan, 1985, 2000) it was expected that competence and relatedness would have a significant relationship with happiness. Competence did have a significant relationship and a positive correlation, albeit weak with happiness. These findings do reflect previous research, such as from Bopp et al. (2016) and Johannes et al. (2021) who also used the PENS scale and found that competence was a positive predictor of well-being. Relatedness did not reach significance although there was a weak positive correlation between relatedness and happiness. Barr and Copeland-Stewart (2021) have done previous research looking and the social aspects of video games. Their findings line up with the results from this study that video games played socially have a positive impact on well-being.

The present study wanted to examine why people play video games. What were the motivating factors involved for those who play at least once a week? A significant relationship between competence and happiness was expected and subsequently found. SDT argues that there is a desire to feel competent at a skill or activity and through this desire being fulfilled, happiness will be higher. SDT also argues that feelings of relatedness to others are a basic psychological motivator. The present study did not support SDT. This is likely due to the questions investigating relatedness reporting a Cronbach alpha reliability of .58 (Appendix G)

#### **4.4 Strengths and Limitations**

The present study comprised several strengths. The first is that the variables (hours played per week, feelings of engagement, competence, and relatedness) have never been examined together. The present study investigated an underrepresented area of video game study. There is a lack of research with a focus on the motivational reasons for why people play games which fills a gap in research.

The present study has a fairly representative split of gender in participants with 48 men and 34 women and 10 self-identifying. There is a good age range of participants from 18-

34. The demographics of the present study make it more representative of the general population. The present study also employed a purposive sampling method, only allowing participants to complete the survey if they have played at least once a week. This was done to ensure there were consistent video game players taking part in the research.

The scales used (Game Engagement Questionnaire, Oxford Happiness Questionnaire, and Player Experience Needs Satisfaction Scale) in the present study also has high internal consistency (GEQ = .85, OHQ = .91, PENS, Competence = .84) and were found to be highly reliable besides the relatedness subscale which will be discussed in the limitations

The present study also comprised of a couple methodical weaknesses. First of all, studying the video game experience while the individual is not actively playing a video game has its limitations and may compromise external validity. This was the intention to achieve a larger sample size with a more survey-based design.

Another weakness may be due to the chosen subscales used for competence and relatedness only comprised three questions each. The author only located one survey instrument applicable and unfortunately only the PENS subscales for competence and relatedness asked only 3 questions. This may not provide enough information to draw comprehensive conclusions from the results.

#### **4.5 Suggestions for future research**

The current study may provide some guidance for those looking to investigate the relationship between hours played per week, feelings of engagement, and motivations for video game play with happiness. Future research could also benefit from looking at cause and effect rather than solely a correlational design. The results may have differed if an experimental design was employed where the participants play a game and answered the questionnaires could make the results more reliable and give more control to the researcher to eliminate any confounding variables. Future researchers could also seek out more reliable and longer scales for competence and relatedness could provide more reliable, consistent, and repeatable results.

Lastly, Future research could investigate different genres of games that the participants play and see if the results differ. For example, happiness might vary between those who play puzzle games than from those who play horror games.

#### **4.6 Conclusion**

Video games have become one of the fastest growing and most successful industries in the last 40 years with more than 3 billion gamers around the world. The present study investigated the relationship between hours of video game play time, feelings of engagement, relatedness, and competence with happiness and discovered two significant results and two insignificant results. Engagement and relatedness were not significant predictors of happiness which were unexpected (Chiang et al., 2011; Barr & Copeland-Stewart, 2021). It was also found that competence was a significant predictor of happiness. The present study indicates that feelings of competency could be a motivating factor for people who play video games and increases happiness. Higher hours per week had a negative relationship with happiness. This study also showcases that too many hours played per week could have an adverse effect on happiness. These results supported previous findings (Johannes et al., 2021; Hull et al., 2013) advancing the knowledge of video games and happiness.

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# *Appendices*

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## ***6.1 Appendix A – Ethics Form***

**IADT Psychology Ethics Committee (PEC)**

**Application Form 2022-2023**

Instructions:

1. Please read all sections carefully, include all of the information relevant to your project, and include all necessary appendices.
2. All students must complete Sections 1, 2, 3, and 4. You will also need to complete at least one other section, depending on the type of research that you plan to do.
3. Email the completed form to your supervisor for approval. They will then complete Section 0 below.
4. Your supervisor will then forward the application to the ethics committee.
5. If your application is under the Red Route, then you may also be required to submit four printed copies of your application (including all appendices). You will be advised closer to the deadline if this is necessary or not.
6. If your study changes from how you have described it in this form then you will need to reapply for approval from the PEC. The PEC does not guarantee that a revised project will be approved, even if the original project was approved.
7. All communication between students and the PEC will occur via the student's project supervisor.
8. The PEC will consider all of the information provided in the form when making their decision. Incomplete forms (including forms which do not include all of the necessary Appendices) will be rejected.
9. If the PEC's decision is that a revised application must be made then they will provide a list of required changes which are necessary to ensure participant wellbeing. Even if all of these are followed, the PEC makes no commitment to approve a revised application.
10. It is highly recommended that 'Red Route' students continue to formulate ideas for projects which fit the criteria for 'Green Route' and 'Amber Route' submissions until they are advised that their application has been approved. This is to ensure that the student can still complete the module, even if their 'Red Route' project does not receive approval from the PEC.
11. There is an obligation on the researcher to bring to the attention of the PEC any issues with ethical implications not clearly covered by the checklist in Section 6 of this form.
12. 'Signatures' may be typed, scanned in, or digitally signed.

**Section 0: For Completion by the Supervisor**

I confirm that this application to the PEC by \_\_\_\_\_ Ciaran Byrne \_\_\_\_\_ accurately reflects all of the ethical implications in the project.

Application type (tick all that apply for mixed methods):

Green Route \_\_\_\_\_

Amber Route   X  

Red Route \_\_\_\_\_

Signed: Dr Tim McNichols

Date: 24/11/22

**Section 1: Project Information**

Student Name: Ciaran Byrne

Student Email Address: [N00191403@iadt.ie](mailto:N00191403@iadt.ie)

Supervisor Name: Dr Tim McNichols

Working Project Title: Does video game engagement affect happiness?

Main Variables Being Investigated: Game engagement, time played, happiness

**Section 2: External Agencies**

Does your project involve recruitment from any external agency (e.g. a school, sports club, medical centre, voluntary organisation, or any other organisation outside of the IADT)?	Yes*	No ✓
* You must include a letter from a senior manager of each organisation stating that you have approval to collect data within that organisation. Include copies of each of these letters in the Appendices to your application. If the organisation has its own ethical review board (which is very common in some settings, such as hospitals), then you are also required to get ethical approval from that board prior to starting data collection, and to submit notice of this approval to your supervisor so that it can be forwarded on to the ethics committee. Some online forums also require permission to post requests for participants – make sure to check the relevant forum/organisation’s code of conduct or terms and conditions. You do not need to include approval letters if you are conducting recruitment using mainstream social media routes (e.g., Twitter, Instagram, Facebook, Snapchat, TikTok) to your own followers, and/or snowball sampling/word of mouth recruitment.		

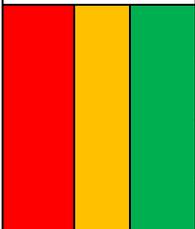
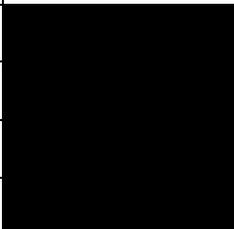
**Section 3: Project Methodology – Please tick which type of project you are seeking approval from the PEC for. If your project involves mixed methods, then tick all which apply.**

Route Type	Methodology	Tick here
Green Route (no direct contact)	Theoretical paper / systematic literature review / Rapid Structured Literature Review (RSLR)	<input checked="" type="checkbox"/>

with participants required, and no data is collected/recorded which could identify participants)	Novel analysis of an existing dataset gathered by another researcher or group which you are certain has abided by appropriate ethical procedures for the relevant discipline	
	Observation of participants in a public place in which they could reasonably be expected to be observed by strangers or in an online space which does not require users to log in to access.	
	Content analysis of material which is publicly available and does not require users to log in to access content.	
	Other method without direct contact with participants **	
Amber Route (direct contact with participants, but no additional ethical considerations beyond the minimum requirements)	Requirements gathering for and/or user testing of a prototype which is highly unlikely to cause any harm or distress to participants and which does not aim to collect data from a potentially vulnerable group	
	An experiment which is highly unlikely to cause any harm or distress to participants and which does not aim to collect data from a potentially vulnerable group	
	A survey/questionnaire design which is highly unlikely to cause any harm or distress to participants and which does not aim to collect data from a potentially vulnerable group	✓
	An observational study which is highly unlikely to cause any harm or distress to participants and which does not aim to collect data from a potentially vulnerable group	
	Content analysis research which is highly unlikely to cause any harm or distress to participants and which does not aim to collect data from a potentially vulnerable group	
	Interviews and/or focus groups which are highly unlikely to cause any harm or distress to participants and which do not aim to collect data from a potentially vulnerable group	
	Other method which is highly unlikely to cause any harm or distress to participants and which does not aim to collect data from a potentially vulnerable group **	
Red Route (direct contact with participants, including one or more project aspects which require special	Requirements gathering for and/or user testing of a prototype which may cause harm or distress to participants and/or which involves collecting data from any potentially vulnerable group	
	An experiment which may cause harm or distress to participants and/or which involves collecting data from any potentially vulnerable group	
	A survey/questionnaire design which may cause harm or distress to participants and/or which involves collecting data from any potentially vulnerable group	

ethical consideration)	An observational study which may cause harm or distress to participants and/or which involves collecting data from any potentially vulnerable group	
	Content analysis research which may cause harm or distress to participants and/or which involves collecting data from any potentially vulnerable group	
	Interviews and/or focus groups which may cause harm or distress to participants and/or which involves collecting data from any potentially vulnerable group	
	Any project which includes use of any illegal materials or substances as part of the materials for the study, regardless of methodology employed.	
	Any project which includes use of any dangerous materials or substances as part of the materials for the study, regardless of methodology employed.	
	Any project employing ethnographic or autoethnographic methodologies.	
	Other method which may cause harm or distress to participants and/or which involves collecting data from any potentially vulnerable group **	
** If you are using a methodology not listed above then provide a short description (fewer than 100 words) here:		

#### Section 4: Checklist of Attached Appendices and Other Completed Sections

Applicable Project Ethics Route Colour Guide		Section / Item	I have attached this item/completed this section	I have checked with my supervisor and we have agreed that this item/section is not relevant to my project
	1	Section 1	✓	
	2	Section 2	✓	
	3	Section 3	✓	
	4	Section 4	✓	

Red	Yellow	Green	5	Letters of permission from any external agencies to be used for data collection		✓
			6	Statement of approval from ethical review boards in external agencies		✓
Green			7	Section 5 (Green Route Projects only)		✓
Red	Yellow		8	Section 6 (Amber and Red Route Projects only)	✓	
Yellow			9	Section 7 (Amber Route Projects only)	✓	
Red			10	Section 8 (Red Route Projects only)		✓
			11	Section 9 (Red Route Projects only)		✓
			12	Evidence of why you need to complete a Red Route Project (see note in Section 8)		✓
			13	Project Information Sheet (Red Route Projects only)		✓
			14	Project Consent Form (Red Route Projects only)		✓
			15	Project Demographic Questionnaire (Red Route Projects only)		✓
			16	All Other Questionnaires and Data Collection Materials (Red Route Projects only)		✓
Red			17	Project Debrief (Red Route Projects only)		✓

### Section 5: Declaration of a Green Route project

I hereby declare that [all of / this aspect of (delete as appropriate)] my project involves no direct interaction between me and any research participants, and that having checked with my supervisor, that I do not need to seek informed consent from those whose data I use in my research. In addition, I will ensure that all data which I do gather is held in a manner which is compliant with GDPR, and will be deleted once it is no longer required (and definitely within 6 years of collection). At all times my study will be conducted in adherence to the ethical policies of the Psychological Society of Ireland and the British Psychological Society.

Student Signature: \_\_\_\_\_ Date: \_\_\_\_\_

\_\_\_\_\_

### Section 6: Confirmation of Adherence to Basic Ethical Principles for Amber and Red Route Projects

Complete the Table below with guidance from your supervisor. If you need to tick any of the 'red' boxes, then your project must be submitted under the 'Red Route'.

		Yes	No	N/A
6.1	I will describe the main research procedures to participants in advance so that they know what to expect. I will use the sample Information Sheet provided by PEC to do this.	✓		
6.2	I will tell participants that their participation is voluntary.	✓		
6.3	I will obtain written consent from participants using a 'tick' consent form which follows the current template provided by PEC prior to starting data collection.	✓		
6.4	I will verify that participants still wish to include their data in online studies by including a final indicator of consent at the end of the questions.	✓		
6.5	If my research involves content analysis or observation in any private or partially private setting then I will ensure to obtain informed consent prior to collecting data.	✓		
6.6	I will explain to participants that they can withdraw from the study at any time and for any reason.	✓		
6.7	I will ensure that participants know that they can refrain from answering any question that they don't want to, even if this is part of a psychometric scale.	✓		
6.8	If using an online data collection method I will ensure that the only questions which require answers in order to proceed are the questions relating to providing informed consent, and I will ensure that participants are provided with an option which indicates that they do not give their consent.	✓		
6.9	I will inform participants that their data will be treated with full confidentiality, and that, if published, it will not be identifiable as theirs.	✓		
6.10	I will debrief participants at the end of their participation (i.e. give them a brief explanation of the study, whether or not deception was involved) following the current template provided by PEC	✓		
6.11	I will obtain passive consent from parents/guardians for studies involving people aged between 16 and 18 years, as well as active consent from the participant and their school/organisation	✓		
6.12	I will obtain active consent from parents/guardians for studies involving people aged under 16 years. Where feasible I will also obtain active consent from the participant themselves. I will ensure that the parent/guardian or their nominee (e.g. a teacher) will be present throughout the data collection period.			✓
6.13	I will ensure that my project supervisor has full access to the data that I collect and will only use data collection software which permits this.	✓		

6.1 4	I will ensure that my project supervisor retains full rights to the data collected, including the ability to delete all data at any time, and that third-parties (e.g., software companies) will not 'own' the data collected.	✓		
6.1 5	I will ensure that participants in studies involving Virtual Reality (VR) are not susceptible to extreme motion sickness or other physical conditions which may result in harm to the participants. I will ensure that a chaperone is present during VR sessions, and that the participant has the option of also having a nominee of their choosing present as well.			✓
6.1 6	I will ensure that any equipment used in this study is cleaned and disinfected after each participant, and that appropriate hygienic barriers (e.g. masks) are used by all participants			✓
6.1 7	Is there any realistic risk of any participant experiencing either physical or psychological distress or discomfort?		✓	
6.1 8	I plan to use animals as part of my research study		✓	
6.1 9	I plan to tell participants their results on a task or scale which I am using in my research.		✓	
6.2 0	I am researching a sensitive topic which may cause some participants distress (such as, but not limited to, religion, sexuality, alcohol, crime, drugs, mental health, physical health, parenting, family relationships)		✓	
6.2 1	One or more aspects of my study is designed to change the mental state of participants in a negative way (such as inducing aggression, frustration, sadness, etc.)		✓	
6.2 2	My study involves deception or deliberately misleading participants in some way.		✓	
6.2 3	My target population includes people who have learning or communication difficulties		✓	
6.2 4	My target population includes patients (either inpatient or outpatient)		✓	
6.2 5	My target population includes people in custody		✓	
6.2 6	My target population includes people who may feel under personal or professional pressure to take part in my research (for example, close friends; family; employees or staff of managers or school principals who may support the research).		✓	
6.2 7	My project includes the use of any illegal materials or substances as part of the materials for the study, regardless of methodology employed.		✓	
6.2 8	My project includes the use of any dangerous materials or substances as part of the materials for the study, regardless of methodology employed.		✓	

6.2 9	My project employs ethnographic or autoethnographic methodologies.		✓	
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### Section 7: Declaration of an Amber Route project

I hereby declare that [all of / this aspect of (delete as appropriate)] my project involves no risk of physical, emotional, social or cognitive harm to participants; that I will obtain full informed consent from all participants and provide a full debrief afterwards (using the templates provided); that I will provide full anonymity and/or confidentiality to participants; and that my participants are not a potentially vulnerable population. In addition, I will ensure that all data which I gather is held in a manner which is compliant with GDPR, and will be deleted once it is no longer required (and definitely within 6 years of collection). At all times my study will be conducted in adherence to the ethical policies of the Psychological Society of Ireland and the British Psychological Society.

\* Student Signature: Ciaran Byrne

Date: 24/11/22

### ***6.2 Appendix B – Information Sheet***

**Title :** Video Game play time per week, Engagement, Competency and Relatedness relationship with Happiness

#### **What is the purpose of this study?**

Much of the current research on video games and happiness looks only at the impact of engagement and does not consider the motivation for playing games. This study aims to see if there is an underlying motivational reason for those who play video games and if these motivational reasons along with engagement will impact happiness.

#### **Who is/Why are you being invited to take part?**

You are being invited to take part in this study because you are a regular video game player. Those who do not play video games at least once a week will be excluded from this study.

**What is involved?**

If you choose to participate, you will be asked demographic questions about your age and gender followed by three questionnaires. The first one will ask about your engagement with video games. The second one will ask about the components of your game experience and the third and final one is about your well-being. This should take roughly 8 minutes

**Do I have to take part?**

You are free to decide whether you wish to take part or not. If you do decide to take part, you will be asked to sign a consent form that lets us know you have read this information sheet and understand what is involved in the research. You are free to withdraw from this study at any time and without giving reasons.

**What are the disadvantages and risks (if any) of taking part?**

The questionnaires will ask about your relationships with video games. If you are prone to frustration while playing video games you may experience frustration while answering the survey. If for any reason at all you can decide to skip questions or sections if you wish.

**What are the possible benefits of taking part?**

I cannot promise this study will help you, but the information collected in this study will help to increase the understanding of the relationship of video game engagement, feelings of competency and relatedness on happiness.

**How will my information be used?**

Your responses to the questionnaire will be combined with all other participants data and statistically analysed. No individual's data will be identifiable and will remain anonymous in the final report. The results of this analysis will be reported in the thesis for the BSc (Hons) in Applied Psychology in the Dun Laoghaire Institute of Art, Design & Technology. This can be requested through the library at IADT, or by emailing the researcher or supervisor at

N00191403@iadt.ie and tim.mcnichols@iadt.ie. This study may also be published in an academic journal article and may be written about for blog posts or media articles and these can be requested from the researcher.

### **How will my data be protected?**

Under the EU General Data Protection Regulation (GDPR) the legal basis for collecting data for scholarly research is that of public interest. The regulations regarding the protection of your data will be followed. Only data which is needed for analysis will be collected. By giving your consent to take part in the study you are consenting to the use of your data as detailed in this information sheet.

The data will be retained by the researcher for at least one year, and may be retained for up to 7 years if the results of the study are published in certain capacities (e.g. in a journal article). There is also a possibility that the fully anonymised dataset may be submitted to a journal and made available to other researchers and academics worldwide for verification purposes, but if this occurs it will be ensured that you are not identifiable from the data.

As the supervisor on this project, I, Tim McNichols am responsible for ensuring that all datasets will be stored in accordance with GDPR regulations and those which are not submitted to a journal will be fully deleted on or before 1st February 2030

You will find contact information for IADT's Data Protection Officer, Mr Bernard Mullarkey, and more information on your rights concerning your data at <https://iadt.ie/about/your-rights-entitlements/gdpr/>

### **Who has reviewed the study?**

This study has been approved by the IADT Psychology Ethics Committee.

What if you have any questions or there is a problem?

If you have a concern about any aspect of this study, you may wish to speak to the researcher(s) who will do their best to answer your questions. You should contact Ciaran Byrne – N00191403@iadt.ie or their supervisor, Tim McNichols - tim.mcnichols@iadt.ie.

Thank you for taking the time to read this information sheet

Date

6th January 2023

### ***6.3 Appendix C – Consent Form***

**Title of Project:** The relationship between video game Playtime per week, Engagement, Competency and Relatedness on Happiness

**Name of Researcher/s:** Ciaran Byrne

Please tick box

- 1 I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions.
- 2 I understand that my participation is voluntary and that I am free to withdraw at any time.
- 3 I understand that data collected about me during this study will not be identifiable when the research is published.
- 4 I am over 18
- 5 I agree to take part in this study.

### ***6.4 Appendix D – Demographic Questions***

Please provide us with an anonymised code which we can use to identify your data if you later wish to have it removed from our dataset. You can do this by using the second letters of your first and last name? (E.g, if your name is Jane Smith, these letters would be 'AM') and the last three digits of your mobile phone number (E.g AM + 0875996842 = AM842).

What is your gender identity? (Male, Female, Non-Binary, etc)

- Male
- Female
- Non-Binary
- Prefer not to say

Age: In Years

Enter your answer

How often would you say you play video games

- Every day
- More than three days a week
- Once a week
- A couple times a month
- A couple times a year

How many hours per week do you estimate that you play video games?

Enter your answer

Do you most often play video games with a group or by yourself?

Group

By yourself

### ***6.5 Appendix E - Game Engagement Questionnaire***

	Never	Often	Sometimes	Rarely	Never
I lose track of time					
Things seem to happen automatically					
I feel different					
I feel scared					
The game feels real					
If someone talks to me, I don't hear them					

I get wound up					
Time seems to kind of stand still or stop					
I feel spaced out					
I don't answer when someone talks to me					
I can't tell that I'm getting tired					
Playing seems automatic					
My thoughts go fast					
I lose track of where I am					
I play without thinking about how to play					
Playing makes me feel calm					

I play longer than I meant to					
I really get into the game					
I feel like I just can't stop playing					

**6.6 Appendix F - Player Experience Needs Satisfaction Scale (PENS)**

	Do Not Agree						Strongly Agree
C1. I feel competent at the game.							
C2. I feel very capable and effective when playing.							
C3. My ability to play the game is well matched							

with the game's challenges							
R1. I find the relationships I form in this game fulfilling.							
R2. I find the relationships I form in this game important.							
R3. I don't feel close to other players. (-)							

**6.7 Appendix G – Cronbach Alpha for Competence and Relatedness Sub Scales of PENS**

**-Competence**

**Reliability Statistics**

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.840	.840	3

**Item-Total Statistics**

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
comp1	11.31	4.309	.705	.540	.777
comp2	11.47	4.116	.776	.609	.706
comp3	11.39	4.719	.636	.419	.842

**-Relatedness**

**Reliability Statistics**

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.579	.588	3

**Item-Total Statistics**

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
related1	8.67	7.390	.529	.477	.278
related2	8.93	6.328	.548	.483	.206
related3	9.53	9.585	.152	.026	.813

**6.8 Appendix H- Oxford Happiness Questionnaire**

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately agree	Strongly agree
I don't feel particularly pleased with the way I am						

I am intensely interested in other people						
I feel that life is very rewarding						
I have very warm feelings towards almost everyone						
I rarely wake up feeling rested						
I am not particularly optimistic about the future						
I find most things amusing						
I am always committed and involved						

Life is good						
I don't think that the world is a good place						

I laugh a lot						
I am well satisfied about everything in my life						
I don't think I look attractive						
There is a gap between what I would like to do and what I have done						
I am very happy						
I find beauty in some things						

I always have a cheerful effect on others						
I can fit in everything I want to						
I feel that I am not especially in control of my life						
I feel able to take anything on						
I feel fully mentally alert						
I often experience joy and elation						
I do not find it easy to make decisions						
I do not have a particular						

sense of meaning and purpose in my life						
I feel I have a great deal of energy						
I usually have a good influence on events						
I do not have fun with other people						
I don't feel particularly healthy						
I do not have particularly happy memories of the past						

### ***6.9 Appendix I – Confirmation of consent form***

Having completed the questionnaire \*

- I consent to the researchers using my answers for their research
- I wish to have my answers removed from the research

### ***6.10 Appendix J - Debrief Form***

Thank you very much for taking part in this research study.

This study aims to see if there is an underlying motivational reason for those who play video games and if these motivational reasons along with engagement will impact happiness.

#### **Withdrawal information**

If you have any questions about this study, or if you would like to withdraw your data from the study, please contact the researcher or supervisor at N00191403@iadt.ie and tim.mcnichols@iadt.ie. In your email let them know your unique ID code You created this using second letters of their name and last 3 digits of phone number. If you submit a request for data removal, all data collected from you will be securely deleted. You will be able to remove your data from the study until 19th March 2023 when the data will be combined and analysed. Data removal will not be possible after that date. Please keep a copy of this information in case you wish to remove your data after leaving this screen.

#### **Data protection**

Your data will be treated according to GDPR regulations. You will find contact information for IADT's Data Protection Officer, Mr Bernard Mullarkey, and more information on your rights concerning your data at <https://iadt.ie/about/your-rights-entitlements/gdpr/>

## Support resources

If you have been affected by the content of this study in any way, the organisations below may be of assistance.

Samaritans- [www.samaritans.org](http://www.samaritans.org)

HSE: <https://www2.hse.ie/mental-health/services-support/supports-services/>

Thank you again for taking the time to participate in this research.

If you have any questions about this study, please contact the researcher Ciaran Byrne at N00191403@iadt.ie or supervisor Tim McNichols, [tim.mcnichols@iadt.ie](mailto:tim.mcnichols@iadt.ie)

## 6.11 Appendix K - SPSS Output of Predictor Variable Correlations

		Correlations				
		Happiness	HoursPerWeek	Engagement	Relatedness	Competence
Pearson Correlation	Happiness	1.000	-.131	.127	.084	.227
	HoursPerWeek	-.131	1.000	.140	.115	.260
	Engagement	.127	.140	1.000	.312	.208
	Relatedness	.084	.115	.312	1.000	.197
	Competence	.227	.260	.208	.197	1.000
Sig. (1-tailed)	Happiness	.	.106	.115	.213	.015
	HoursPerWeek	.106	.	.091	.138	.006
	Engagement	.115	.091	.	.001	.023
	Relatedness	.213	.138	.001	.	.030
	Competence	.015	.006	.023	.030	.
N	Happiness	92	92	92	92	92
	HoursPerWeek	92	92	92	92	92
	Engagement	92	92	92	92	92
	Relatedness	92	92	92	92	92
	Competence	92	92	92	92	92

**6.12 Appendix L – SPSS Output of Tolerance Values for No Multicollinearity**

**Coefficients<sup>a</sup>**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	
1	(Constant)	2.691	.542		4.963	<.001	1.613	3.768				
	HoursPerWeek	-.017	.008	-.214	-2.026	.046	-.033	.000	-.131	-.212	-.206	.923
	Engagement	.114	.131	.094	.868	.388	-.147	.374	.127	.093	.088	.876
	Relatedness	.015	.057	.029	.265	.792	-.098	.129	.084	.028	.027	.883
	Competence	.185	.078	.257	2.381	.019	.031	.340	.227	.247	.242	.888

a. Dependent Variable: Happiness

**6.13 Appendix M – SPSS Output of assumption of collinearity**

**Residuals Statistics<sup>a</sup>**

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	3.4056	4.5697	4.0039	.21158	92
Std. Predicted Value	-2.828	2.674	.000	1.000	92
Standard Error of Predicted Value	.074	.275	.144	.045	92
Adjusted Predicted Value	3.4579	4.4517	4.0006	.20926	92
Residual	-2.09440	1.54730	.00000	.63235	92
Std. Residual	-3.239	2.393	.000	.978	92
Stud. Residual	-3.338	2.466	.002	1.006	92
Deleted Residual	-2.22543	1.64333	.00330	.67047	92
Stud. Deleted Residual	-3.554	2.542	.002	1.021	92
Mahal. Distance	.205	15.522	3.957	3.239	92
Cook's Distance	.000	.145	.012	.024	92
Centered Leverage Value	.002	.171	.043	.036	92

a. Dependent Variable: Happiness

**6.14 Appendix N – Model Summary and Multiple Regression Analysis**

**Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.317 <sup>a</sup>	.101	.059	.64672	1.967

a. Predictors: (Constant), Competence, Relatedness, HoursPerWeek, Engagement

b. Dependent Variable: Happiness

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.074	4	1.018	2.435	.053 <sup>b</sup>
	Residual	36.387	87	.418		
	Total	40.461	91			

a. Dependent Variable: Happiness

b. Predictors: (Constant), Competence, Relatedness, HoursPerWeek, Engagement