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PERSONALITY AND PLAY: WHAT DRIVES MOTIVATION IN SUBNAUTICA?

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DECLARATION

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This Thesis is entirely my own work and has not been previously submitted to this or any other third-level institution.

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ABSTRACT

Numerous previous studies have researched the connection between personality and motivation in films. However, few studies have researched this topic on video games. Therefore, this study aimed to study people who enjoy feeling negative emotions while playing the video game Subnautica by examining how personality traits relate to motivation. The supporting three hypothesis were as follows:

- H1: Players describe Subnautica as an emotionally challenging gaming experience.
- H2: Players with specific personality traits report a higher overall enjoyment of Subnautica.
- H3: Personality traits significantly impact intrinsic motivation levels in Subnautica.

A total of 34 eligible participants were surveyed. The 50-item self-report Big Five Inventory was employed to examine personality traits. The 15-item self-report Five-Factor Inventory of Intrinsic Motivations to Gameplay modified to focus on the video game Subnautica was applied to measure intrinsic motivations. A linear regression using Pearson's Correlation Coefficient uncovered one single correlation: a positive correlation between the personality trait Neuroticism and the intrinsic motivation Immersion was found with a R of 0.406 and a *p*-value of 0.017.
The results yielded the conclusion that, regarding H1, 79.4% of participants rated Subnautica as somewhat emotionally challenging or very emotionally challenging; in regards to H2, there were no positive correlations between personality traits and enjoyment of Subnautica, with a Fun *p*-value higher than 0.05; concluding with H3, only the personality trait of Neuroticism and the intrinsic motivation factor of Immersion were found to be positively correlated in individuals who played Subnautica.

1. INTRODUCTION & LITERATURE REVIEW

Video games are a complex mixture of systems and mechanics that play with our emotions and motivations (Isbister, 2016). They create an engaging player experience by combining positive and negative emotions through a balance between increasing challenge and abilities (Abuhamdeh et al., 2015; Gowler & Iacovides, 2019). When emotional challenge, deriving from difficult topics or in-game decisions, creates unbalance, it is praised as stimulating, appealing and rewarding (Bopp et al., 2018; Cole et al., 2015; Gowler & Iacovides, 2019).

Video games have been used for decades as an activity for recreation, having been associated with both negative and positive effects: on the negative side, video games have been connected to violent behavior and lower psychological well-being; on the positive side, video games are associated to a sense of achievement and power (Ryan et al., 2006).

Video games increasingly provide emotionally rewarding and thought-provoking experiences, making emotions a substantial part of the player experience (Bopp et al., 2016). With this, personality and motivation are frequently connected in research as being impactful for the enjoyment of different activities (C. T. Martin et al., 2021). While the connection of negative emotions to enjoyment has been researched on films, where viewers have no control over the story, little research has focused on video games, where players exert control in the form of player agency (Bowman & Tamborini, 2012; Egenfeldt-Nielsen et al., 2012; Flanagan & Nissenbaum, 2014; Klimmt & Hartmann, 2006; Lynch & Martins, 2015; Tamborini & Bowman, 2010).

This research will answer the question: does a combination of personality traits and intrinsically motivational factors enhance the enjoyment of negative emotions in Subnautica?

1.1. Identity

Identity is considered as a shared set of definitions that constitute the individual in three dimensions: roles in society, groups in society and unique individual characteristics (Stets & Serpe, 2013). Unique characteristics reflect a combination of the individual's personality traits, physical attributes, interests, and biography, which influence a person's values and beliefs, and, consequently, how they interact with the world. Trait Theory states that we shape our personality through our self-identity with traits helping form our spontaneous self-concept early on (McCrae & Costa, 1999).

1.2. Personality

Personality is a combination of self-processes unique to each individual, manifesting characteristic patterns of behaviors, feelings and thoughts (Diener et al., 2014). Personality traits are assessed in three points: consistency of behavior across different situations; stability of behaviors over time; and individual differences (Diener et al., 2014). Different theories postulate distinct dimensions through which to place people.

Personality traits are viewed as the basis for the formation of relationships, alliances and competition for resources, from a social perspective, making it imperative to aggregate individuals with variations of personality traits in the same group (Buss, 1996).

1.2.1. Personality models

Going as far back as Sigmund Freud's or Gordon Allport's contributions to personality research (Mautz et al., 2020; Zhang, 2020), personality psychology has

had major breakthroughs in exploring in-depth explanations for behavior and personality with consequentially plentiful theories to approach.

1.2.1.1. Cattell's 16 personality factors

Raymond Cattell had a scientific and mathematical approach toward psychology, which he used when proposing a model of personality based on 16 primary factors, measured using the 16 Personality Factor Questionnaire (16PF). Cattell's approach to explain the trait sphere yielded thousands of adjectives to describe human behavior that he later reduced to 16 primary factors of personality: Warmth, Reasoning, Emotional stability, Dominance, Liveliness, Rule-consciousness, Social boldness, Sensitivity, Vigilance, Abstractedness, Apprehension, Openness to change, Self-reliance, Perfectionism, and Tension (Cattell, 1943). Cattell (1943) approached these 16 traits as elementary units for the formation of every individual's personality, a tool to help predict behavior in various contexts.

1.2.1.2. Eysenck's three-factor model (or PEN model)

Eysenck (1967) proposed the Three-Factor Model or PEN model, Psychoticism (impulsivity, aggressiveness), Extraversion (sociability, energy), and Neuroticism (emotional stability), emphasizing the biological basis of personality, particularly the role of brain functioning in determining extraversion and neuroticism, leading to the development of psychometric tools such as the Eysenck Personality Questionnaire (EPQ). However, Eysenck's PEN model seems to bring a limited scope and an over-simplified view of personality, which does not fully explain the reasoning behind individuals playing video games: three dimensions do not account for the richness and complexity of human behavior, and it is not cross-culturally validated (Revelle, 2016).

1.2.1.3. Myers-Briggs type indicator

Jung (1971) suggested that individuals could be categorized into different groups based on their preferences for perceiving and processing information, laying the foundation for the Myers-Briggs Type Indicator (MBTI). The MBTI classifies individuals in sixteen types grouped in four domains, Extraversion vs. Introversion, Sensing vs. Intuition, Thinking vs. Feeling, and Judging vs. Perceiving – even though it is widely used in personal development and organizational settings, it is criticized for lack of empirical evidence supporting its validity (Pittenger, 2005).

1.2.1.4. Five-factor model

The Five-Factor Model (FFM) is a theory that describes personality through five robust factors, initially discovered by Tupes & Christal (1992), and currently held as: Openness (O) (creativity, curiosity), Conscientiousness (C) (self-discipline, organization), Extraversion (E) (sociability, assertiveness), Agreeableness (A) (compassion, cooperativeness), and Neuroticism (N) (emotional instability, anxiety).

The most consensual way to assess personality traits is through the Big Five Questionnaire, a survey created by McCrae & Costa (1999), stemming from Trait Theory and based on the assumption that every individual falls under a universal personality system. Even though the FFM encompasses extensive research on human behavior that other personality theories do not, underpinning on the basis of knowability, rationality, variability, and proactivity, making it widely cross-culturally validated and accepted by the scientific community (McCrae & Costa, 1999), it may be considered to be oversimplified while presenting self-reporting bias (McAdams, 1992).

In agreement with Trait Theory, personality traits are considered to define the individual person, proposing that, if we were able to make an exact copy of an

individual and expose the copied version to the exact same external influences as the original individual, then the copied version would remain an exact copy of the original individual. In fact, according to the FFM, everybody possesses the same five traits with different variations of each one, which also accounts for different levels of adaptive strategies (McCrae & Costa, 1999) to effectively cope with challenges, achieve goals, and navigate social situations, namely: individuals scoring high in Openness embrace creativity and new ideas to solve problems, adapt to change and learn from new experiences; individuals high in Conscientiousness plan and organize to meet deadlines and long-term goals, using self-discipline and attention to detail to maintain performance and reliability; individuals high in Extraversion engage socially to build networks and gain support, being assertive when leading and collaborating in group settings; individuals high in Agreeableness foster cooperation and empathy in relationships, resolving conflicts through understanding and compromise; and individuals high in Neuroticism, use emotional awareness to develop coping techniques like mindfulness or reframing to handle anxiety or mood swings, while individuals low in Neuroticism have the ability to remain calm under stress (Meléndez et al., 2020). Furthermore, the FFM is frequently used as a framework in the scope of personality theories due to its comprehensiveness, universality and predictive robustness in understanding human behavior, which is linked to various domains, one of which is video games.

Different players exhibit distinct preferences based on their personality traits, which directly influence their motivations within video games: Extraversion is associated with social engagement, seeking out multiplayer or competitive experiences (e.g., massive multiplayer online role-playing games (MMORPGs), cooperative multiplayer games, competitive e-sports); Openness relates to a player's interest in exploring new worlds, narratives, or engaging with complex game mechanics, making them more inclined to play games with deep storylines or creative elements (e.g., RPGs, open-world games, narrative games); Conscientiousness affects how players approach goal-setting and achievement within games, likely motivating them to complete tasks, level up or excel in structured, rule-based environments

(e.g., RPGs, puzzle games, strategy games); Neuroticism affects a player's reaction to challenges in games (players high in neuroticism might become frustrated or stressed in high-pressure situations or choose games that offer less challenge, such as casual games); and Agreeableness relates to how cooperative or competitive a player is (players high in agreeableness may be drawn to cooperative multiplayer games, while low agreeableness may correlate with competitive and antagonistic gameplay) (Kowert, 2015; Nettle, 2009; Park et al., 2011; Potard et al., 2020; Ryan et al., 2006; VandenBerghe, 2012).

Individuals with certain personality types may be intrinsically motivated to pursue negative emotions in video games (Tang et al., 2020; Wang et al., 2021). Even though research on this topic has been done mainly on films instead of video games, a positive correlation between seeking and enjoying negative emotions in tense moments was found in films in individuals high in conscientiousness, extraversion, and openness, and in individuals low in neuroticism and agreeableness (G. N. Martin, 2019a).

As individuals present different traits that may influence their game preferences and play style, there are also underlying motivations to play video games, which will be developed throughout this thesis.

1.2.1.5. HEXACO model

The HEXACO model is rooted in the FFM, adding a sixth factor to further enlarge the scope of the FFM, and presenting some similarities with high scorers displaying the following characteristics: Extraversion, propensity to show confidence, leadership, motivation to interact with others; Agreeableness, propensity to be more willing to compromise, manage their temper, forgive easily; Conscientiousness, propensity to carefully consider decisions, discipline, accuracy and perfection; Openness, propensity to be imaginative, immersing in nature and art; Emotionality, propensity to be more anxious, crave more emotional support, feel deeper empathy towards others, and fear physical dangers; and the sixth

dimension that does not exist in the FFM, Honest-Humility, propensity to be fair, modest, sincere, which provides an improved explanation for behaviors in the lens of corruption and unethical conduct (Lee & Ashton, 2014). Although useful at understanding general personality traits, the HEXACO model is not as widely accepted as the FFM, and it does not capture the FFM's nuances to the complexities of the human personality.

1.2.1.6. The dark tetrad

The Dark Tetrad is grounded in the HEXACO model while approaching the personality traits most commonly tied to amoral and antisocial behavior: Machiavellianism, the manipulation and enjoyment of power; Narcissism, the feeling of superiority compared to others; Psychopathy, the lack of empathy and the willingness to exploit others; and Sadism, the derivation of pleasure from others' pain or humiliation (Međedović & Petrović, 2015; Paulhus & Williams, 2002). Međedović & Petrović (2015) have shown that Dark Tetrad personality traits can be situated on the negative side of the Conscientiousness, Agreeableness, Honesty-Humility and Emotionality dimensions, while sadism should retain its own dimension. The Dark Tetrad shows a limited scope to personality theory applied to video games as it focuses on maladaptive traits, overemphasizing interpersonal harm.

1.3. Motivation and player engagement

Individuals feel a sense of satisfaction in certain systems of gameplay, such as progression or conquer, or simply to escape from real-life problems or boredom (Olson, 2010; Sherry et al., 2006; Wan & Chiou, 2006; Wu et al., 2010; Yee, 2006). The connection to other players facilitated by games has also been a topic of

discussion among researchers, such as collaboration or developing relationships (Ryan et al., 2006; Sherry et al., 2006; Wan & Chiou, 2006; Wu et al., 2010).

Engagement is one of the most prevalent capabilities of video games (Brown & Cairns, 2004; Jennett et al., 2008; Rigby & Ryan, 2011), it is described as an investment of effort, time and attention to overcome obstacles originated from player preference and controls. When this investment becomes emotional as well, players want to keep playing (Brown & Cairns, 2004).

Engagement must, however, be sustained, primarily through the attribution of meaning, which is defined as sense of purpose, value and impact (Ariely, 2016).

Przybylski et al. (2010) suggest that, more than just playing for fun, one becomes engaged in video games as means to express oneself differently than one would in real life, which is possible through the properties of the game. The motivations to play video games may lie in extrinsic factors produced from the game, such as games systems, or in intrinsic factors originating from the players themselves, such as behavior archetypes stemming from personal desires (Brodd & Passas, 2021; Mekler et al., 2013; Schoenau-Fog, 2011; Volkmar et al., 2019).

Malone (1981) postulated that intrinsic motivation is constituted by: challenge, whereby personal goals may or may not be attained by learned skills, depending on the difficulty level, providing feelings of competence, efficacy and self-esteem; intrinsic fantasy, which depends on skill to be elicited and on the type of fantasy each individual finds appealing, and it can also help with applying old knowledge to grasp new knowledge; curiosity, where an environment offers an optimal level of complexity and novelty, thus not becoming too simple nor too difficult; and informative feedback, meaning the engagement increases when the feedback is surprising and constructive.

When analyzing behavior through the lens of social cognitive theory of self-regulation, individuals learn by setting challenging goals for themselves (Bandura, 1988, 1991; Schunk, 1990), by creating strategies to achieve those goals (Zimmerman, 1989), and by employing the necessary self-regulation measures to orient their behaviors (Bandura & Cervone, 1983, 1986). There has been some debate on the relationship between motivational self-regulation and self-efficacy,

the individual's belief in his/her ability to perform (Bandura, 1986; Seo & Ilies, 2009). One approach states that self-efficacy can positively influence individuals to set more challenging goals, thus contributing to performance, which correlates to the socio-cognitive theory; a different approach states that, if the level of difficulty of goals remains the same, self-efficacy develops overconfidence, lowering levels of performance (Seo & Ilies, 2009). Vancouver et al. (2008) justify this with the explanation that there is a difference between accepted goals and chosen goals: high self-efficacy leads to a higher expectation of achieving the goals with less effort and persistence, resulting in lower motivation and performance in accepted goals; however, with chosen goals the goals and self-efficacy are higher, leading to motivation and performance increase.

1.3.1. Flow theory

Playing video games may affect the individual's awareness of their surroundings, characterized by a feeling of presence (Baños et al., 2004; Barfield & Zeltzer, 1995; Clark, 1997; Slater, 1999). Concurrent to presence, flow is a state of feeling completely immersed in the task at hand (Nakamura & Csikszentmihalyi, 2009).
Csikszentmihalyi (1990) introduces individuals who experience flow as being in control of their psychological conscious state, further connecting intrinsic motivation and flow: individuals who can achieve a flow state during adversity are not easily disturbed by external events, thus exhibiting the trait of a non-self-conscious individual, *i.e.*, someone who is guided by a non-self-seeking sense of purpose.
Lombard & Ditton (1997) supported the connection of intrinsic motivation with flow by proposing that: firstly, presence, as a factor of immersion, engulfs the perceptive system of the individual in a virtual environment in a the most compelling way; secondly, presence, as a medium, leads to a response from the individual towards the content of a medium as if the medium was not there.

In video games, flow is defined as the balance between challenge and player's abilities, where the challenge is neither too difficult nor too easy throughout the progression of the game (Abuhamdeh et al., 2015; Chen, 2007; Gowler & Iacovides, 2019). Additionally, an important consideration of intrinsic motivation in video games in Csikszentmihalyi's definition of flow is the sense of agency, characterized by the freedom of choice and control (Madsen, 2016; Nakamura & Csikszentmihalyi, 2009; Tanenbaum & Tanenbaum, 2009). Building upon the flow theory, Hoffman & Novak (1996) created a model of flow in computer-mediated environments postulating that enjoyment involves challenge/arousal, exploratory behaviors and positive emotions, comprising eight sections (immersion, control, social interaction, skills, challenge, concentration, feedback, clear goals). This balance between several game components adds to the feeling of flow. Nonetheless, when unbalance deriving from emotional challenge when considering difficult topics or in-game decisions, it is praised as stimulating, appealing and rewarding, and actually increases engagement (Bopp et al., 2018; Cole et al., 2015; Gowler & Iacovides, 2019). Research has found that player experience and negative emotions share a complex symbiosis (Birk et al., 2015).
Although presence can be related to intrinsic motivations, Rigby (2004) argues that a theory for motivation should account for psychological elements associated with persistence and enjoyment across multiple video game genres and player types, which flow theory does not account for. Furthermore, the self-determination theory can be viewed as the basis for flow theory as they both look at enjoyment of the task, and flow theory states that flow occurs when a task is intrinsically motivated (Ryan & Deci, 2004). Nonetheless, flow theory does not sufficiently explain motivation as it focuses on the behavior characteristics regarding the balance between skill and challenge rather than the psychological elements that underline that behavior (Kowal & Fortier, 1999).

1.3.2. Self-determination theory

Self-determination theory (SDT) postulates that individuals are motivated by the search for gratification through the satisfaction of basic needs, namely: Competence, the sense of ability; Autonomy, the sense of individuality and freedom; and Relatedness, the sense of connection with others. These intrinsic motivations help explain that video games provide gratifications and serve as reasons to play (Ryan et al., 2006). Moreover, even though the SDT addresses external and internal motivations, intrinsic motivation is found to be the type of motivation connected to play and sport (Frederick & Ryan, 1993, 1995).

Enjoyment translates to the meaning behind progression, volition and connection with others being closely tied to the SDT's respective axes of competence, autonomy and relatedness (Hodent, 2017). This means that social games are connected to feelings of relatedness, whereas games that provide more agency, *i.e.*, freedom of choice, are tied to feelings of competence (Rogers, 2017; Ryan et al., 2006).

Deci et al. (1991) state that the relationship between autonomy and competence is mutually dependent as autonomy decreases in a controlled environment, reducing the sense of competence; correspondingly, an environment that exerts less control over the individual contributes to the effects of internalization, the process of converting one's own regulation from external sources into a self-regulation though internal processes, thus helping autonomous self-regulation.

Cognitive evaluation theory, a subset of the SDT, proposes that intrinsic motivation is dependent on autonomy and competence (Deci & Ryan, 1985). The perception of autonomy is high when individuals pursue or do activities by interest or by attributing value, which is achieved by choice, freedom, positive feedback and instructions (Ryan et al., 2006). Games present themselves in a multitude of variations, meaning that, even if individuals pursue video games by their own volition, autonomy is not guaranteed in the different movement, strategies, goals and tasks of video games. Consequently, the perception of competence is supported by opportunities to acquire new abilities, positive feedback and

challenges, resulting in the sense of competence being viewed as the most important motivator out of the three proposed in the self-determination theory (Ryan et al., 2006). When the video game controls are deemed intuitive, they contribute to a sense of freedom and control, thus enhancing the sense of competence.

With this, the motivation behind playing video games is justified by Malone & Lepper (1987) as wanting to satisfy internal needs and by Bartle (1996) because they are “fun”, supporting the widely researched groundwork of the SDT (Ryan et al., 2006).

The SDT can be assessed through self-reporting tools, as is the case of the Five-Factor Inventory of Intrinsic Motivations to Gameplay (IMG) created by Vahlo & Hamari (2019). The IMG serves the purpose of assessing intrinsic motivations to gameplay. The motivation theory that the IMG is partially based on the SDT regarding perceived Relatedness, Autonomy and Competence, while also including Immersion and Fun (Vahlo & Hamari, 2019).

While personality and motivation are two distinct components of the individual, the SDT approaches behavioral self-regulation and personality development, aligning the FFM with the SDT in understanding how players behave playing video games: players who score high in Openness may be motivated intrinsically by novelty, abstraction, exploration, predictability and creativity; players high in Conscientiousness may be more extrinsically motivated by achieving in-game goals, completing tasks, or receiving rewards; players high in Extraversion may be both intrinsically and extrinsically motivated by the social engagement of the game; players high in Agreeableness may be intrinsically motivated by collaboration and teamwork; and players high in Neuroticism may be intrinsically motivated to avoid stressful situations, *i.e.*, escapism (Deci & Ryan, 2000; Kowert, 2015; Nettle, 2009; VandenBerghe, 2012). It is, then, highly appropriate to mention both the SDT and the FFM when discussing motivation in video games as it provides a comprehensive framework for understanding individual differences in player behavior and preferences.

1.4. Agency

Agency, in the context of the psychology of personality, refers to the capacity for self-directed action, decision-making, and control over one's life and environment, playing a critical role in shaping how individuals pursue goals, deal with challenges and make decisions (Bandura, 2006). Agency is closely linked to concepts of autonomy, self-efficacy, and self-determination, which involve an individual's belief in their ability to influence outcomes in their lives (Legault & Inzlicht, 2013).

The degree of freedom that players possess in a game varies from game to game, for instance, the role-playing game Dungeons & Dragons provides a high degree of agency, while Chutes and Ladders, or War, do not provide any agency elements (Camp, 2023).

The effects of enjoyment, particularly through negative emotions, have been extensively researched in the context of films, although the role of the added agency of video games have lacked research (Bowman & Tamborini, 2012; Egenfeldt-Nielsen et al., 2012; Flanagan & Nissenbaum, 2014; Klimmt & Hartmann, 2006; Lynch & Martins, 2015; Tamborini & Bowman, 2010).

Rotter (1966) described the concept of the locus of control as the individual's belief about the degree to which they can control the events in their lives, *i.e.*, individuals with an internal locus of control believe they can influence outcomes through their actions, leading to a higher sense of agency; conversely, those with an external locus of control tend to believe that their actions have little impact on external events, which undermines their agency and motivation to act. The locus of control and personality traits show a strong correlation as seen through, for example: individuals scoring high in Conscientiousness often present an internal locus of control, as conscientious individuals are more likely to believe that their efforts will yield results; and individuals scoring high in Neuroticism are associated with an external locus of control, as individuals with this trait may feel more vulnerable and less able to influence outcomes (Dumitriu et al., 2014).

Bandura & Cervone (1983) proposed that self-efficacy refers to an individual's belief in their ability to successfully accomplish tasks or achieve goals, *i.e.*, high

self-efficacy is strongly related to agency and higher likelihood to take proactive steps and exercise control over their lives. Personality traits, particularly Conscientiousness and Extraversion, have been shown to be positively correlated with self-efficacy: individuals high in Conscientious tend to set realistic goals and work diligently toward achieving them, thus enhancing their sense of agency; individuals high in Extraversion often believe in their ability to influence social situations, thereby enhancing their social agency (Schunk & Ertmer, 2000).

Agency and personality have been explored in regards to the influence personality traits exert in agency, such as: individuals scoring high in Conscientiousness are often more organized, goal-oriented, and persistent, presenting a higher sense of agency, as these individuals are more likely to take control of situations, set long-term goals, and follow through with their plans; individuals high in Extraversion show a tendency to be more socially active and assertive, often taking initiative in group settings, increasing their sense of agency, particularly in social contexts, while increasing the likelihood of taking risks and seeking out opportunities for control and influence in their environment; individuals high in Neuroticism are linked with emotional instability, anxiety and a tendency to feel a lack of control, thus reducing the sense of agency, as they may often feel overwhelmed by external events or perceive themselves as powerless in shaping their outcomes; individuals high in Openness tend to be more adaptable and willing to explore new ideas, enhancing their agency, as they may seek out new ways to engage with the world and shape their own experiences; individuals high in Agreeableness are associated with cooperativeness and a tendency to avoid conflict, which can sometimes reduce the sense of agency, while at times exerting agency in prosocial ways using their interpersonal influence to help others or foster harmony (Costa & McCrae, 1992; McCrae, 1996).

Agency and motivation can be analyzed through the lens of SDT as it posits that individuals must satisfy three psychological needs in order to experience intrinsic motivation and optimal functioning: when satisfying the need for Autonomy, the individual feels in control of their actions and decisions, perceiving their behavior as self-directed and consistent with their values; when satisfying the need for

Competence, the individual feels effective in interacting with the environment, perceiving themselves as more likely to take initiative and exert agency to achieve their goals; and when satisfying the need for Relatedness, the individual feels connected to others (Deci & Ryan, 1985).

1.5. Bartle's taxonomy of player types

In a pioneering attempt to explain players' behaviors, preferences and enjoyment, Bartle (1996) created a theoretical model for the taxonomy of player types. It states that players belong to one of four axes determined by two measurements of player behavior: first, interacting with vs acting on the game elements; secondly, focusing on the digital environment vs other players. The result is four types of behaviors demonstrated by players: Socializers, who interact with other players; Killers, who act on other players; Explorers, who interact with the virtual environment; and Achievers, who act on the digital world (Bartle, 1996, 2003). In order to be a successful game, it has to provide gratification to all four types of players.

When associating SDT, FFM and Bartle's taxonomy of players, one can have an overview of the connections: Achievers, who demonstrate a high degree of agency in their games as they focus on completing tasks and reaching milestones, are aligned with the satisfaction of the need of Competence and show a high degree of the trait Conscientiousness, as they are typically persistent, structured, organized, goal-oriented, and focused on achievement; Explorers, whose sense of agency comes with open-ended gameplay while uncovering game features and discovering secrets through their own decisions, show the satisfaction of the needs Autonomy and Competence as they are motivated by the freedom to discover new parts of the game world, aligning with a higher degree of Openness due to their curiosity, creativity, and love of novelty; Socializers, who exercise agency in how they interact within the game's social systems, are linked to the need for Relatedness and tend to score higher on Agreeableness, as they enjoy cooperation and maintaining harmonious relationships; lastly, Killers, who exhibit

high agency as they influence the game world by engaging in competitive play, asserting dominance and control, present the needs for Competence and Autonomy, while showing higher scores of Extraversion and Neuroticism, as their motivations often revolve around high levels of stimulation, competitiveness, and potentially more impulsive or aggressive behavior.

Building upon Bartle's taxonomy of player types, Yee (2006) further grouped players into three categories based on the reasons for playing: immersion by wishing to escape from real life problems; socialization by wanting to develop in-game relationships while interacting with other players; and achievement by wanting to compete and master skills (Colder Carras et al., 2019; Ryan et al., 2006). Similarly, while adding to intrinsic motivations, some players possess personality traits that connect negative emotions to enjoyment, which Bartle's player taxonomy has not been able to explain.

1.6. Research questions

The present study has the objective of understanding how personality traits have influence on the intrinsic motivation and enjoyment of negative emotions to play Subnautica by studying the following hypotheses:

- H1: Players describe Subnautica as an emotionally challenging gaming experience.
- H2: Players with specific personality traits report a higher overall enjoyment of Subnautica.
- H3: Personality traits significantly impact intrinsic motivation levels in Subnautica.

2. METHODOLOGY

2.1. Research framework

The research was designed towards exploring a correlation between personality traits and motivational interests.

Regarding personality traits, the FFM was the most accurate framework to employ in the context of this research. With this, the five personality traits were considered to be the first five variables, *i.e.*, Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism.

With reference to motivation, it was important to frame the motivational aspects of playing a video game, which are not the same as performing other activities. There is a lack of research around video games, and, thus, around the motivation behind playing video games. The SDT has been the most commonly referenced theory around this topic, which makes sense as it approaches intrinsically motivated activities as fun and entertaining (Deci & Ryan, 1985; Ryan & Deci, 2000). Supporting the SDT, Vahlo & Hamari (2019) present a suitable tool to measure players' intrinsically motivating gameplay. With this, the Five Intrinsic Motivation Factors in Gameplay were considered to be the second set of five variables, *i.e.*, Relatedness, Autonomy, Competence, Immersion, and Fun.

The objective of correlating the five personality traits with the five motivation factors was to answer two hypotheses, H2 and H3.

2.2. Materials

The research pays attention to the processes involved in the collection of this type of information. The questionnaires were converted into a single form for convenience, containing both questionnaires, a briefing of the study and a debriefing message, materializing into a quantitative and unmoderated study. The

form was disseminated through social media, such as Reddit's Subnautica subchannel, Subnautica's Discord channel, LinkedIn, and shared with acquaintances who knowingly played games.

The method of data collection was determined by the use of a pre-screening questionnaire and two widely validated questionnaires, one for personality and one for motivation:

2.2.1. Pre-screening questionnaire (APPENDIX B)

The questions that were considered to be important to profile the participants included the following sections:

- Fluency in English: the questionnaire was provided in English only, thus excluding those who do not understand it.
- Age: the study was designed for individuals over and including 18 years old.
- Gender identity: data used to correlate personality traits and motivation items with gender.
- Current living location: data used to correlate personality traits and motivation items with possible cultural elements connected to where the individual resides.
- Weekly hours of gaming: the aim was for participants who play video games at least 2 hours per week.
- Played games: a list of video games was provided to better understand the player profile of the respondents.
- Total hours of gameplay of Subnautica: participants must have played a minimum of 5 hours of Subnautica to safeguard the engagement with the video game and the encounter with the Leviathan Reaper, an enemy present in Subnautica that will be explained further in section "2.4. The video game: Subnautica".

- Color of the Leviathan Reaper: this question was requested to determine if participants had in fact encountered the Leviathan Reaper.
- Last play session of Subnautica: individuals who played Subnautica more than 5 years ago were excluded due to the possible memory problems that would occur in trying to recollect moments experienced during gameplay.
- Rate Subnautica's on an emotionally challenging scale: in order to validate H1, participants were requested to rate Subnautica from very emotionally challenging to very emotionally unstimulating.

Although initially designed to contain all ten pre-screening questions, the length of the entire session was deemed too extensive during the pilot run and some questions were removed. The final version excluded demographic questions and contained: total hours of gameplay of Subnautica, color of the Leviathan Reaper, last play session of Subnautica, and rate Subnautica's on an emotionally challenging scale.

2.2.2. Big-five questionnaire (APPENDIX C)

In order to assess personality traits, a 50-item questionnaire was provided. The questions were framed under the question "How accurately can you describe yourself?", requiring participants to describe themselves honestly as they generally currently are, not as they wish to be in the future, and to regard themselves in relation to other people they know of the same gender and age as they are. The questions are listed as follows:

Question	**BFI Marker / Direction**
1. Am the life of the party.	Extraversion +
2. Feel little concern for others.	Agreeableness -
3. Am always prepared.	Conscientiousness +

4. Get stressed out easily.	Neuroticism +
5. Have a rich vocabulary.	Openness +
6. Don't talk a lot.	Extraversion -
7. Am interested in people.	Agreeableness +
8. Leave my belongings around.	Conscientiousness -
9. Am relaxed most of the time.	Neuroticism -
10. Have difficulty understanding abstract ideas.	Openness -
11. Feel comfortable around people.	Extraversion +
12. Insult people.	Agreeableness -
13. Pay attention to details.	Conscientiousness +
14. Worry about things.	Neuroticism +
15. Have a vivid imagination.	Openness +
16. Keep in the background.	Extraversion -
17. Sympathize with others' feelings.	Agreeableness +
18. Make a mess of things.	Conscientiousness -
19. Seldom feel blue.	Neuroticism -
20. Am not interested in abstract ideas.	Openness -
21. Start conversations.	Extraversion +
22. Am not interested in other people's problems.	Agreeableness -
23. Get chores done right away.	Conscientiousness +
24. Am easily disturbed.	Neuroticism +
25. Have excellent ideas.	Openness +
26. Have little to say.	Extraversion -
27. Have a soft heart.	Agreeableness +
28. Often forget to put things back in their proper place.	Conscientiousness -
29. Get upset easily.	Neuroticism +
30. Do not have a good imagination.	Openness -
31. Talk to a lot of different people at parties.	Extraversion +
32. Am not really interested in others.	Agreeableness -

33. Like order.	Conscientiousness +
34. Change my mood a lot.	Neuroticism +
35. Am quick to understand things.	Openness +
36. Don't like to draw attention to myself.	Extraversion -
37. Take time out for others.	Agreeableness +
38. Shirk my duties.	Conscientiousness -
39. Have frequent mood swings.	Neuroticism +
40. Use difficult words.	Openness +
41. Don't mind being the center of attention.	Extraversion +
42. Feel others' emotions.	Agreeableness +
43. Follow a schedule.	Conscientiousness +
44. Get irritated easily.	Neuroticism +
45. Spend time reflecting on things.	Openness +
46. Am quiet around strangers.	Extraversion -
47. Make people feel at ease.	Agreeableness +
48. Am exacting in my work.	Conscientiousness +
49. Often feel blue.	Neuroticism +
50. Am full of ideas.	Openness +

Table 1 – Big Five Questionnaire

For each statement individuals are asked to indicate whether it is 1. Very Inaccurate, 2. Moderately Inaccurate, 3. Neither Accurate Nor Inaccurate, 4. Moderately Accurate, or 5. Very Accurate as a description of themselves. These five scales were developed to measure the Big Five factor markers reported by Goldberg (1992). For + keyed items, the response "Very Inaccurate" is assigned a value of 1, "Moderately Inaccurate" a value of 2, "Neither Inaccurate nor Accurate" a 3, "Moderately Accurate" a 4, and "Very Accurate" a value of 5. For - keyed items, the response "Very Inaccurate" is assigned a value of 5, "Moderately Inaccurate" a value of 4, "Neither Inaccurate nor Accurate" a 3, "Moderately Accurate" a 2, and "Very Accurate" a value of 1. Once numbers are assigned for all of the items in the scale, all the values are averaged to obtain a total scale score.

2.2.3. Five-factor inventory of intrinsic motivations to gameplay (APPENDIX D)

The 15-item scale was selected to measure players' intrinsically motivating gameplay on five domains: relatedness, autonomy, competence, immersion and fun. The questions were further customized by adding the word "Subnautica" to each item, where opportune, to add context regarding the study, although their validity was not objected. Furthermore, the questions relating to relatedness were removed due to the fact that Subnautica is a single-player game and, thus, it only allows one player's input throughout the gameplay. The list of questions is as follows:

Question	**IMG Marker / Direction**
1. I play Subnautica because it is entertaining.	Fun +
2. I play Subnautica because of the challenge.	Competence +
3. I play Subnautica because in this video game I can make my own decisions.	Autonomy +
4. I play Subnautica because in this video game I can make a difference with my actions.	Autonomy +
5. I play Subnautica to master my skills and to win myself.	Competence +
6. I play Subnautica because it is enjoyable.	Fun +
7. I play Subnautica to make progress and to achieve objectives.	Competence +
8. I play Subnautica because game events bring about emotions.	Immersion +
9. I play Subnautica because I want to identify with the game characters.	Immersion +
10. I play Subnautica because the game's story and its mysteries fascinate me.	Immersion +
11. I play Subnautica because it is relaxing.	Fun +

12. I play Subnautica because in this video game I can make meaningful choices.	Autonomy +

Table 2 - Five-Factor Inventory of Intrinsic Motivations to Gameplay

2.3. The video game: Subnautica

The scope of the research was narrowed with the use of the video game Subnautica. Subnautica is an open-world action-adventure survival video game developed and published by Unknown Worlds Entertainment in 2018 (Unknown Worlds, n.d.).

Regarding the narrative of the game, it begins with the hero crash-landing in the ocean on another planet. As the sole survivor, the hero has to explore the ocean to be able to gather resources and craft equipment to escape this planet and go back to Earth.

Subnautica has a large fan-base, regularly hosting thousands of simultaneous active players, 51,156 of which were active 7.2 years preceding the publication of this study, and it is rated with mostly positive reviews (SteamDB, n.d.).

The Entertainment Software Rating Board rated Subnautica as ESRB Everyone 10+, with content generally suitable for ages 10 and up, possibly containing cartoon, fantasy or mild violence, mild language and/or minimal suggestive themes (Entertainment Software Association, n.d.).

It is relevant to mention that this study was produced without any affiliation whatsoever with Unknown Worlds.

The importance of Subnautica, namely the inclusion requirement of having reached at the Leviathan Reaper rested in the successful completion of the onboarding phase of the game, which refers to the phase when players learned the rules and tools of the game, mastering the fundamental skills needed to play the game and to achieve the early-stage wins. The Leviathan Reaper is also a character who elicits strong negative emotions in players; it is a character that players cannot see until reaching a specific area of the map, although they can hear its vocalizations.

Furthermore, Subnautica exhibits elements of survival that can lead to negative emotions stemming from tense moments, such as immersive agency from a first-person perspective (e.g. locomotion, driving, combat with weapons), unknown creatures attacking by proximity, limited resources (e.g. oxygen timer) potentially leading to character's death, exploration of the unknown in dimly lit areas while hearing creature's barks, most precious resources located in most dangerous places that one can only reach with a set of skills (e.g. fishing, gathering, crafting, repairing) (Przybylski et al., 2009, 2014).

2.4. Participants

The eligibility criteria to recruit participants considered individuals over the age of 18, who should have played Subnautica until encountering the Leviathan Reaper, the first enemy (or boss) of the game.

Regarding the quantity of participants, the consideration was a minimum of 30 and a maximum of 370. The minimum value is justified by the attainment of the statistical significance; the maximum value is explained as the needed value to extract conclusions with a 5% error margin for a population of 5000, which is the average of simultaneous player count in Subnautica.

2.5. Procedure

Individuals with certain personality traits may be intrinsically motivated to pursue negative emotions as found by G. N. Martin (2019b), thus determining a positive correlation between seeking and enjoying negative emotions in tense moments in films by individuals scoring high in conscientiousness, extraversion, and openness, and scoring low in neuroticism and agreeableness.

In order to evaluate the relationship between enjoyment of the game and personality traits, participants were asked to fill out a form containing a briefing and consent form with General Data Protection Regulation information, a pre-screening questionnaire determining exclusion and inclusion criteria, the Big Five questionnaire, the Five-Factor Inventory of Intrinsic Motivations to Gameplay and a debriefing message. The entire duration of the session was estimated to be approximately 15 minutes.

2.6. Ethical considerations

The present study, its author, supervisor and faculty are not affiliated with Unknown Worlds Entertainment.

Given that the recollection of some moments of gameplay might cause distress, a friendly and supportive group was provided to participants and the author of this study in case symptoms of anxiety are displayed during or after the study: https://www.healthfulchat.org/anxiety-chat-room.html.

3. RESULTS & FINDINGS

The data process and figure generation was done in *Python 3.11.11* using the *pandas*, *numpy*, *seaborn, scipy* and *matplotlib* libraries.

3.1. Eligibility and pre-screening

A total of 34 participants answered the questionnaire, all of which were eligible for participation, having answered positively to the question of consent to participate in the study. To the questions regarding how long ago they played the game and for how long, along with a memory assessment question regarding content, all 34 participants answered accordingly to the inclusion parameters.
The figures below show the distribution of answers to the pre-screening questions:

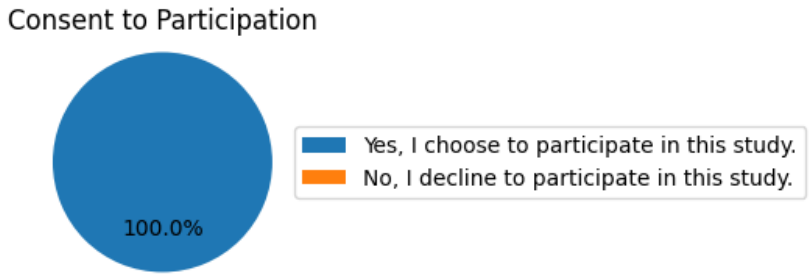

Figure 1 - Distribution of pre-screening answers: Consent to participation

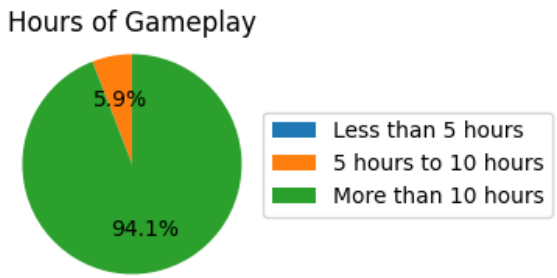

Figure 2 - Distribution of pre-screening answers: Hours of gameplay

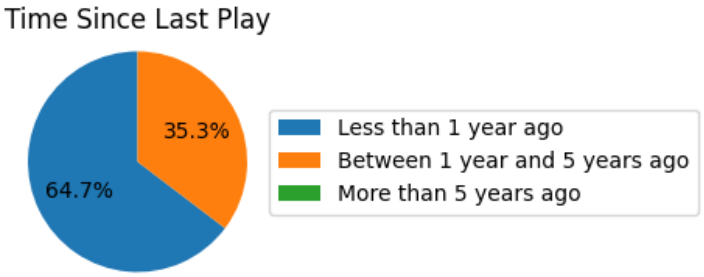

Figure 3 - Distribution of pre-screening answers: Time since last play

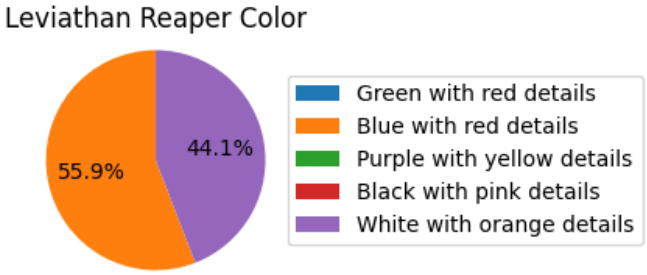

Figure 4 - Distribution of pre-screening answers: Leviathan Reaper color

3.2. Statistical exploration of BFI and IMG

As part of the data treatment the answers to both the Big Five Inventory (BFI) and Five-Factor Inventory of Intrinsic Motivations to Gameplay (IMG) questionnaires were compounded into the corresponding markers according to the instructions mentioned in their sources.

The sources suggest summing up the scores for each marker, resulting in values ranging from 10 to 50 for BFI markers and from 3 to 15 for IMG markers, however this makes reading the values slightly harder since we have to constantly understand which questionnaire each marker belongs to in order to correctly assess the values. To facilitate the understanding of the values provided the values were instead averaged instead of summed. This results in the same relative distribution of the values but has the advantage of improving their readability since

the reader must only know that they were scored, and now presented, on a 5-point Likert scale ranging from 1 to 5.
The tables below present the mean and standard deviations of each marker for both inventories.

Marker	**Mean**	**StdDev**
BFI - Openness	3.84	0.58
BFI - Conscientiousness	3.39	0.74
BFI - Extraversion	2.70	0.78
BFI - Agreeableness	3.70	0.75
BFI - Neuroticism	2.91	0.68
IMG - Autonomy	2.98	0.87
IMG - Competence	3.35	0.73
IMG - Fun	4.28	0.79
IMG - Immersion	3.18	0.70

Table 3 - Mean and standard deviations

To ease the comparison of distributions between multiple groups and to help identify skewness, spread, and potential outliers it is possible to resort to a Box-and-Whisker plot.
The figures below provide the boxplots of all markers for both inventories.

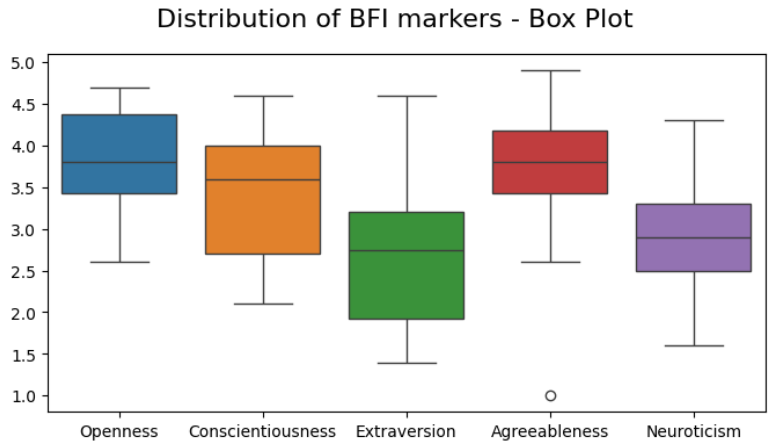

Figure 5 - Distribution of BFI markers

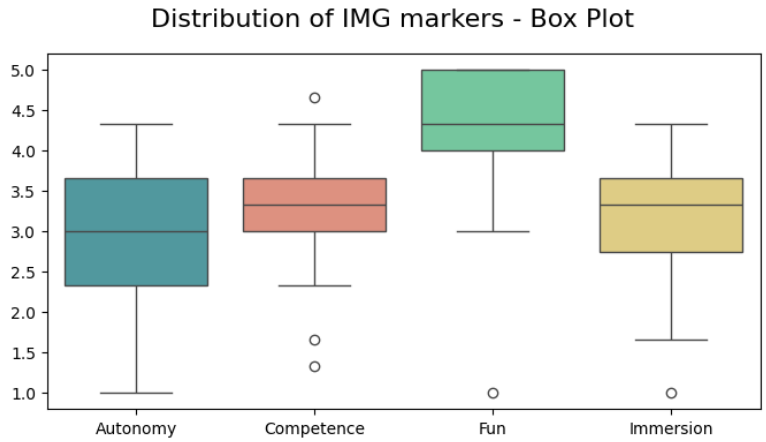

Figure 6 - Distribution of IMG markers

To better understand the shape of the distribution and help identify modes, gaps, and clustering a histogram is often used.

The figures below provide the histograms of all markers for both inventories.

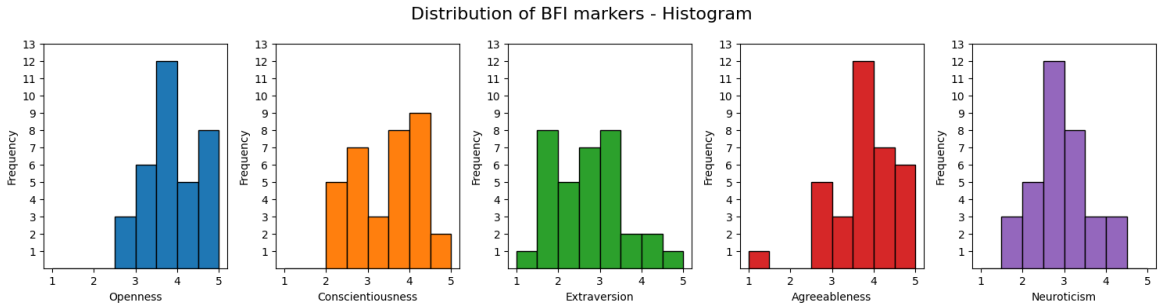

Figure 7 - Distribution of BFI markers

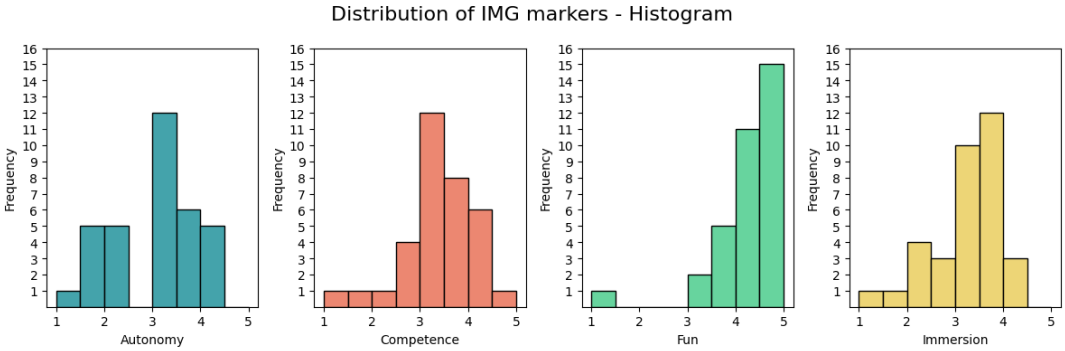

Figure 8 - Distribution of IMG markers

By analyzing the distribution and shape of the markers there is the indication that some of them might not follow a normal distribution. Assessing the normal distribution of each marker is a required step and having non-normal distributions limits the types of tests that are possible to use later on in the evaluation of correlation.

One test which is typically used to evaluate normality in data with less than 50 samples is the Shapiro-Wilk Test (Shapiro & Wilk, 1965). Applying this test to all markers it is possible to conclude some markers do not follow a normal distribution. Below is the table with the corresponding results where *W* represents the statistic result of the test and *p* represents the *p*-value, which if below the chosen *alpha* of 0.05 indicates non-normality with a 95% confidence interval.

Marker	**Statistic**	***p*-value**
BFI - Openness**	0.9484	0.1101
BFI - Conscientiousness	0.9367	0.0491
BFI - Extraversion**	0.9659	0.3575
BFI - Agreeableness	0.9088	0.0079
BFI - Neuroticism**	0.9786	0.7282
IMG - Autonomy**	0.9408	0.0650
IMG - Competence**	0.9437	0.0796

IMG - Fun	0.7789	0.0000
IMG - Immersion	0.8942	0.0032

*Table 4 - Results of Shapiro-Wilk Test. ** indicate normality*

3.3. Correlation tests of BFI and IMG

Correlation tests are used to assess the existence of a correlation between two variables, they measure the strength and direction of a linear relationship between the subjects tested. The results of these tests typically involve two values, which the correlation factor R denoting the strength of the correlation and its direction, where positive values show a positive correlation (when one variable increases in value the other variable increases in value as well) and negative values show a negative correlation (when one variable increase in value the other variable decreases in value).

The tests mentioned below were executed by performing a one-to-one correlation test between all 5 BFI markers and 4 IMG markers.

Pearson's Correlation Coefficient (Pearson's r) is used for analyzing continuous and normally distributed data (Pearson, 1896). Applying this test results in a single correlation between BFI's Neuroticism and IMG's Immersion with a positive correlation (*R*: 0.406, *p*-value: 0.017). However, since Pearson's r test requires continuous and normally distributed data and as seen in the normality tests, Immersion does not display a normal distribution, this result is invalid and cannot be considered for the discussion of the hypothesis.

BFI Marker	**IMG Marker**	**R**	***p*-value**
Openness	Autonomy	-0.227	0.196
Openness	Competence	0.168	0.342
Openness	Fun	0.272	0.119
Openness	Immersion	-0.094	0.597
Conscientiousness	Autonomy	0.219	0.213

Conscientiousness	Competence	0.150	0.397
Conscientiousness	Fun	-0.049	0.783
Conscientiousness	Immersion	0.050	0.777
Extraversion	Autonomy	0.009	0.961
Extraversion	Competence	-0.039	0.825
Extraversion	Fun	0.079	0.656
Extraversion	Immersion	-0.108	0.545
Agreeableness	Autonomy	0.042	0.813
Agreeableness	Competence	0.096	0.588
Agreeableness	Fun	0.246	0.160
Agreeableness	Immersion	-0.012	0.946
Neuroticism	Autonomy	0.075	0.674
Neuroticism	Competence	-0.049	0.782
Neuroticism	Fun	0.069	0.696
Neuroticism**	Immersion**	0.406	0.017

*Table 5 - Results of Pearson's Correlation Coefficient. Underlined values are invalid due to non-normal distributions. ** indicate statistically significant correlation*

In alternative to Pearson's r test, Spearman's Rank Correlation (Spearman's ρ) makes no assumptions regarding the normality of the data and is validated for small samples (Spearman, 1904). Given that all preconditions are met, the results of the test are valid and can be used in discussion of the hypothesis. The application of this test indicates a correlation test with a *p*-value below the 0.05 *alpha* between BFI's Neuroticism and IMG's Immersion with a positive correlation (*R*: 0.510, *p*-value: 0.002). Additionally, it provides the insight that at the moment there is no indication of correlation between any other BFI marker and IMG marker.

BFI Marker	**IMG Marker**	**R**	***p*-value**
Openness	Autonomy	-0.221	0.209
Openness	Competence	0.130	0.463

Openness	Fun	0.123	0.489
Openness	Immersion	-0.051	0.775
Conscientiousness	Autonomy	0.205	0.245
Conscientiousness	Competence	0.141	0.426
Conscientiousness	Fun	0.001	0.996
Conscientiousness	Immersion	0.143	0.420
Extraversion	Autonomy	0.040	0.823
Extraversion	Competence	-0.043	0.808
Extraversion	Fun	0.146	0.410
Extraversion	Immersion	-0.184	0.298
Agreeableness	Autonomy	-0.093	0.600
Agreeableness	Competence	0.083	0.642
Agreeableness	Fun	0.208	0.239
Agreeableness	Immersion	0.039	0.826
Neuroticism	Autonomy	0.099	0.577
Neuroticism	Competence	-0.068	0.704
Neuroticism	Fun	-0.037	0.835
Neuroticism**	Immersion**	0.510	0.002

*Table 6 - Results of Spearman's Rank Correlation. ** indicate statistically significant correlation*

Another technique used for the test of correlation between two variables is Linear Regression, in which the data for both variables being tested are used as x and y coordinates forming a 2D point cloud in which a line is fitted, using Ordinary Least Squares (OLS) in this case, to reduce the average distance to all points (Fisher, 1992). The results of this test follow the results of the Spearman's Rank test and again indicate a correlation test with a *p*-value below the 0.05 *alpha* between BFI's Neuroticism and IMG's Immersion with a positive correlation (*R*: 0.415, *p*-value: 0.017). And again, demonstrate that at the moment there is no indication of correlation between any other BFI marker and IMG marker.

BFI Marker	**IMG Marker**	**R**	***p*-value**
Openness	Autonomy	-0.338	0.196
Openness	Competence	0.211	0.342
Openness	Fun	0.370	0.119
Openness	Immersion	-0.112	0.597
Conscientiousness	Autonomy	0.256	0.213
Conscientiousness	Competence	0.148	0.397
Conscientiousness	Fun	-0.052	0.783
Conscientiousness	Immersion	0.047	0.777
Extraversion	Autonomy	0.010	0.961
Extraversion	Competence	-0.037	0.825
Extraversion	Fun	0.081	0.656
Extraversion	Immersion	-0.096	0.545
Agreeableness	Autonomy	0.048	0.813
Agreeableness	Competence	0.094	0.588
Agreeableness	Fun	0.260	0.160
Agreeableness	Immersion	-0.011	0.946
Neuroticism	Autonomy	0.095	0.674
Neuroticism	Competence	-0.053	0.782
Neuroticism	Fun	0.081	0.696
Neuroticism**	Immersion**	0.415	0.017

*Table 7 - Results of Linear Regression test with OLS. ** indicate statistically significant correlation*

To further improve the interpretation of the data provided by the linear regression test, the plot below displays the point clouds, the fitted line and a shaded area indicating the confidence interval for the pair of BFI's Neuroticism and IMG's Immersion.

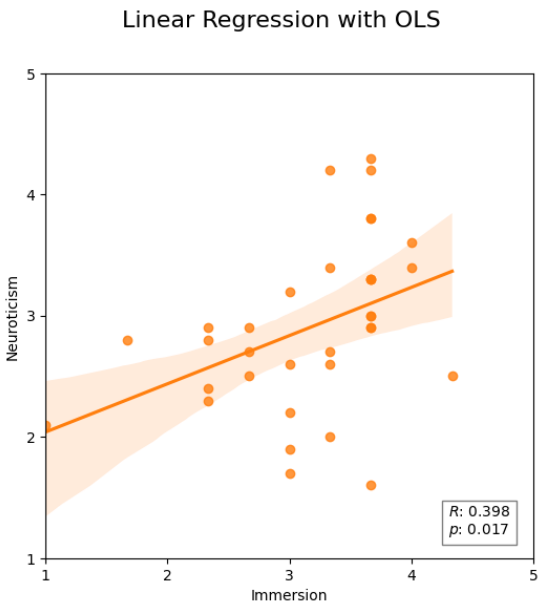

Figure 9 - Plot of Linear Regression with OLS for BFI's Neuroticism and IMG's Immersion

3.4. Analysis of Emotional Attitude

To assess the hypothesis H1 the answers to the question "How much would you rate Subnautica as an emotionally challenging or emotionally unstimulating game?" were analyzed in a similar fashion to the BFI and IMG questionnaires.
The vast majority of the participants (79.4%) rate the game as emotionally or very emotionally challenging. The figure below shows the distribution of answers to the emotional attitude question:

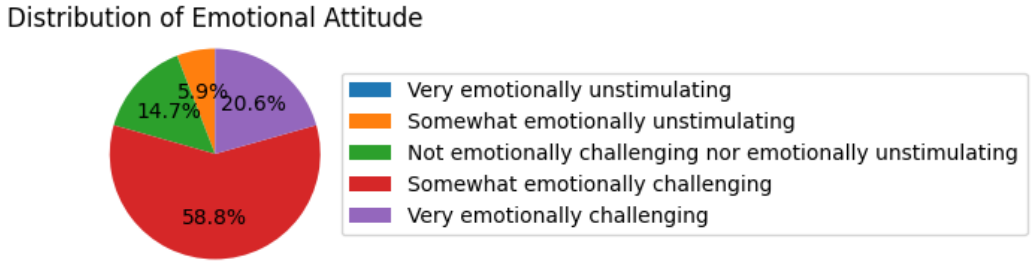

Figure 10 - Distribution of emotional attitude

Using Shapiro-Wilk Test we can conclude the marker does not display a normal distribution, invalidating the usage of Pearson's Correlation test.

Marker	**Statistic**	***p*-value**
Emotional Attitude	0.8127	0.0000

Table 8 - Results of Shapiro-Wilk Test

The application of Spearman's Rank Correlation indicates no correlation between Emotional Attitude and any of the BFI or IMG markers.

Marker	**R**	***p*-value**
BFI - Openness	-0.162	0.361
BFI - Conscientiousness	0.126	0.478
BFI - Extraversion	-0.030	0.867
BFI - Agreeableness	0.158	0.373
BFI - Neuroticism	0.188	0.287
IMG - Autonomy	0.029	0.872
IMG - Competence	0.036	0.840
IMG - Fun	-0.143	0.421
IMG - Immersion	0.197	0.265

Table 9 - Results of Spearman's Rank Correlation with the Emotional Attitude Marker

The Linear Regression indicates the same conclusion of no correlation.

Marker	**R**	***p*-value**
BFI - Openness	-0.106	0.432
BFI - Conscientiousness	0.140	0.416
BFI - Extraversion	-0.041	0.823
BFI - Agreeableness	0.065	0.710
BFI – Neuroticism	0.086	0.587

IMG - Autonomy	-0.019	0.926
IMG - Competence	0.069	0.685
IMG - Fun	0.029	0.877
IMG - Immersion	0.118	0.464

Table 10 - Results of Linear Regression test with OLS, with the Emotional Attitude Marker

4. DISCUSSION

Regarding H1, 79.4% of participants rated Subnautica as emotionally challenging, considering that 58.8% of participants rated Subnautica somewhat emotionally challenging, and 20.6% of participants rated Subnautica as a very emotionally challenging game.

H2 found that there were no positive correlations between personality traits and enjoyment of Subnautica, with an intrinsic motivation factor of Fun with a *p*-value higher than 0.05 across all personality traits.

H3 yielded the most interesting result: the personality trait of Neuroticism and the intrinsic motivation factor of Immersion were found to be positively correlated in individuals who played Subnautica with a R of 0.406 and a *p*-value of 0.017.

Individuals may feel immersed in a state of flow in any given activity (Nakamura & Csikszentmihalyi, 2009). Immersion is defined as “psychological state characterized by perceiving oneself to be enveloped by, included in, and interacting with an environment that provides a continuous stream of stimuli and experiences” (Witmer & Singer, 1998); it can be classified under a sense of feeling involved in a task, and a lack of awareness of time and real world (Jennett et al., 2008). It seems important to relate the concepts of presence, as a factor of immersion, with research by Yee (2006) in which the author categorizes immersion as a motivator for playing, proposing players feel deeply absorbed in the character, environment and digital life of the video game, wishing to escape from real life problems. However, immersion as a motivational factor cannot be justified by personality traits alone, it is also supported by the environment.

In the perspective of the SDT, the fulfillment of Autonomy, Competence and Relatedness leads to an embedment in a state of immersion through game genres, elements and contents (Przybylski et al., 2009; Ryan et al., 2006). Autonomy, Competence and Relatedness can, therefore, be considered precursors of immersion (Vahlo & Hamari, 2019).

The escapism mentioned in Yee's research seems to strongly relate to the defining characteristics of the Neuroticism trait: for individuals high in neuroticism, video games may provide an avenue for escapism, a coping mechanism offering a temporary escape from negative emotions or stressors (Przybylski et al., 2014).

When associating agency with personality, individuals high in Neuroticism are linked with emotional instability, anxiety and a tendency to feel a lack of control, thus presenting a reduced sense of agency and increasing feelings of overwhelm by external factors (Costa & McCrae, 1992; McCrae, 1996). It makes sense that escapism is used to reduce emotional distress in the short term by fulfilling their needs for competence and autonomy, while increasing the sense of control that might be lacking in their real lives (Deci & Ryan, 2000; Kowert, 2015; Nettle, 2009; VandenBerghe, 2012). Video games seem to act as a facilitator for individuals high in Neuroticism to satisfy their needs for Autonomy, in an effort to feel in control of their actions and decisions, and for Competence, endeavoring feelings of effectiveness in interacting with the environment and achieving their goals.

Admittedly, when associating SDT, FFM and Bartle's taxonomy of players, one can struggle with placing individuals high in Neuroticism. High Neuroticism can only be justified, according to Bartle's taxonomy of players, as the Killer player type, with individuals exhibiting high agency by asserting dominance and control, while demonstrating the needs for Competence and Autonomy, as their motivations revolve around high levels of stimulation, competitiveness, and impulsive or aggressive behavior. Nonetheless, if higher Neuroticism indicates a higher degree of agency in video games, can it be assumed that they will be Achievers exerting their need for Competence in completing tasks and reaching milestones, connected to a desire to escape from real life? Immersive experiences might give individuals with high Neuroticism a sense of autonomy they feel they lack in their real lives, which are present in virtual worlds through the control of character's actions and decisions, helping to counterbalance the perceived lack of control that higher Neuroticism generates (Klimmt et al., 2009).

Video games are increasingly becoming a facilitator in the regulation of negative emotions According to SDT, when basic needs are satisfied, the intrinsic motivation

and well-being are enhanced, while immersion can act as the facilitator of emotional regulation – video games have been extensively construed as facilitators for well-being. Immersion in a game that provides these satisfactions could act as a form of emotional regulation, helping individuals with higher Neuroticism feel less prone to emotional instability in the short term, such as in games that offer clear goals, rewards, and challenges that align with a player's abilities (Sherry et al., 2006). Nonetheless, immersion has the potential to develop a maladaptive engagement, since it serves only as temporary relief, and it may not address the underlying emotional needs, preventing individuals from developing more effective solutions for managing ruminative thought patterns and negative emotions (Przybylski et al., 2014; Sherry et al., 2006). Moreover, in individuals already susceptible to low tolerance to aversive stimuli, the maladaptive engagement could potentially lead to a pathological gaming addiction or withdrawal from social interactions, which can exacerbate neurotic tendencies (Afiani et al., 2023).

5. CONCLUSION

This study offers a novel approach to research by combining personality and motivation, particularly using gaming-related questionnaires. The approach considers agency in video games as an essential differentiating factor between video games and other types of media, adding a more robust information on the reason why video games are considered to be engaging.

The results that arise from this study intend to be constructive for the gaming industry, namely in the limited approach that Bartle's taxonomy of player types exhibit. By contributing to a deeper understanding of player types and the correlation between the Neurotic personality trait and the Immersion motivation factor, this study can further aid Game Designers design for their intended audience.

5.1. Limitations

Despite the valuable findings above, several limitations should be outlined. Firstly, the lack of studies about intrinsic motivations and personality focusing on video games limits the available literature review, although it is partially supported by research done in films. Secondly, the challenges to recruitment hindered the number of participants registered for the study, which allowed the attainment of statistical significance, but barely. Thirdly, there was apprehension about the possible issues in remembering and recalling in-game experiences that could have occurred many months or even years before the study took place. Fourthly, the nature of self-report measures may derive erroneous information that other tools reliant on the observer do not derive. Lastly, the study is focused on a single game, Subnautica, making the results hard to extrapolate to other gaming genres.

5.2. Future research

The results of this study reveal that Immersion and Neuroticism are strongly and positively correlated in individuals who play Subnautica.

Further research is an important step to corroborate these findings and expand them within different game genres. Along with adding game genres, research should be supplemented by gameplay periods close to the time of the collection of data for more accurate memory prompts.

Considering the profound value of qualitative methodologies, it should uncover deeper findings. Additionally, focusing the personality measures to the Neurotic trait could help reveal more information on the strong correlation with Immersion.

Finally, although initially contemplated, the study did not request demographic information from the participants. This demographic data, such as age, gender, location, culture or gaming habits, would have helped to evaluate the impact in the test results, as is, for example, the case of the knowledge gap on the female statistics in gaming.

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7. APPENDICES

7.1. APPENDIX A: STUDY INFORMATION AND INFORMED CONSENT

Informed Consent for Anonymous Research Study

Study Title

Personality And Play: What Drives Motivation In Subnautica?

Purpose of the study

You are invited to participate in a research study examining the influence of personality traits on the motivation and enjoyment of negative emotions to play Subnautica. The following hypotheses are proposed:

H1: Players describe Subnautica as an emotionally challenging gaming experience.

H2: Players with specific personality traits report a higher overall enjoyment of Subnautica.

H3: Personality traits significantly impact intrinsic motivation levels in Subnautica.

Procedures

If you choose to participate, you will answer questions about your personality and motivation to play Subnautica through filling out two surveys. The entire session should take approximately fifteen minutes.

Potential risks and benefits

It is unlikely that you will experience any risks or discomforts beyond what would be experienced during a gaming session of Subnautica by participating. There are no specific benefits associated with participating.

You can stop the session at any time temporarily or permanently if you feel uncomfortable or are unwilling to continue. In the case you feel anxiety levels

during the study that are unmanageable and/or uncomfortable to you, please make sure to reach out to this anxiety hotline https://mentalhealthhotline.org/anxiety-hotline/.

Participants

You are being asked to participate in this research study because you fulfill the necessary requirements in regards to profile for this study. You must be 18+ years old to participate in the study.

Compensation

You will not be compensated for participating in this study.

Confidentiality

The data collected in this study are completely anonymous. No personally identifiable information will be collected and the information you choose to provide in this study cannot be connected back to you. Results from this study may be published or presented at research conferences, and the anonymous data may be shared with other researchers through an online data repository.

By choosing to continue with the study, you consent to the use of your data per Articles 6 and 7 of European Union General Data Protection Regulation. If, at any point, you wish to withdraw your permission and data from the study, please reach out to the author of the study Elizabeth Larez at N00236153@iadt.ie.

All data will be saved until December 31, 2025.

Voluntary participation

Your participation in this study is voluntary and you may choose to not participate or end your participation at any time without penalty.

Conflict of interest

The author and supervisor affirm that this proposal was elaborated in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.
This study is not associated with Unknown Worlds Entertainment, Inc.

Authors

Author of the study: Elizabeth Larez
Supervisor: Dr. Naoise Collins
Institution: Institute of Art Design Technology

Questions or concerns

The information in this consent form is to help you decide if you want to participate in this research study. If you have any questions or comments, please reach out to the author of the study Elizabeth Larez at N00236153@iadt.ie.

Consent

I have read and understand the above consent form. I certify that I am 18 years old or older. By clicking the “Next” button to enter the survey, I indicate my willingness to voluntarily take part in this study.

7.2. APPENDIX B: PRE-SCREENING QUESTIONNAIRE

- Informed consent:
    - Please read the consent information sheet at this link [clickable link]. Do you consent to your participation in this study?
        - Answers:
            - Yes, I choose to participate in this study
            - No, I decline to participate in this study [end survey]

- Gaming habits:
    - How long ago was the last time you played Subnautica?
        - Answers:
            - Less than 1 year ago
            - Between 1 year and 5 years ago
            - More than 5 years ago [end survey]
    - How many hours of gameplay do you have in Subnautica?
        - Answers:
            - Less than 5 hours [end survey]
            - 5 hours to 10 hours
            - More than 10 hours
    - What color is the Leviathan Reaper in Subnautica?
        - Answers:
            - Green with red details [end survey]
            - Blue with red details
            - Purple with yellow details [end survey]
            - Black with pink details [end survey]
            - White with orange details
    - How much would you rate Subnautica as an emotionally challenging or emotionally unstimulating game?
        - Answers:
            - Very emotionally challenging

- Somewhat emotionally challenging
- Not emotionally challenging nor emotionally unstimulating
- Somewhat emotionally unstimulating
- Very emotionally unstimulating

7.3. APPENDIX C: BIG FIVE INVENTORY (BFI)

https://ipip.ori.org/new_ipip-50-item-scale.htm

7.4. APPENDIX D: FIVE-FACTOR INVENTORY OF INTRINSIC MOTIVATIONS TO GAMEPLAY (IMG)

Table 2. An EFA of the 23-item motivations to play inventory. Factor loadings and descriptive statistics for the scale.

	Motivations	1	2	3	4	5	Uniq.
1	I play online games because I enjoy interacting with others					0.587	0.394
2	I play because also my friends play					0.776	0.332
3	I play with my family because of the company					0.824	0.330
4	I play with my friends because of the company					0.889	0.214
5	I play because I enjoy especially playing together					0.823	0.250
6	I play because of the challenge			0.693			0.421
7	I play to master my skills and to win myself			0.796			0.335
8	I play to make progress and to achieve objectives			0.620			0.392
9	I play because I want to immerse myself in games	0.644					0.367
10	I play because I want to identify with the game characters	0.810					0.222
11	I play because the game's story and its mysteries fascinate me	0.736					0.397
12	I play because game events bring about emotions	0.822					0.253
13	I play because I want to be part of the gameworld and its events	0.788					0.243
14	I play because it is fun				0.804		0.383
15	I play because playing games is relaxing				0.719		0.439
16	I play because games are entertaining				0.902		0.197
17	I play because games are enjoyable				0.915		0.231
18	I play because playing makes me feel good				0.588		0.400
19	I play because in games I can be independent		0.777				0.338
20	I play because in games I can make my own decisions		0.796				0.306
21	I play because in games I can make a difference with my actions		0.736				0.213
22	I play because in games I can make meaningful choices		0.741				0.206
23	I play because in games I can realize myself and my values		0.549				0.273
	Mean	2.881	3.143	3.378	4.035	2.797	
	Standard Deviation	1.140	1.104	0.984	0.821	1.030	
	Cronbach's Alpha	0.918	0.916	0.836	0.901	0.916	

7.5. APPENDIX E: ETHICS PROPOSAL

IADT Psychology Ethics Committee (PEC)

Application Form 2023-2024

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.
    a. If your project is a Red route application then it must be submitted to your supervisor by **5pm on Monday 20th November 2023.**
    b. If your project is a Green or Amber route application then it must be submitted to your supervisor by **5pm on Monday 27th November 2023.**
4. Your supervisor will then complete Section 0 and will 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.
13. The Psychology Ethics Committee can refuse any application which they consider unsuitable for student research.
14. Occasionally further information may be requested by the PEC with regard to Green and Amber route project applications where there is uncertainty regarding these applications. In some cases a Green or Amber route project ethics application may need to be reformatted and resubmitted as a ‘Red’ route application.
15. If you receive approval from the Psychology Ethics Committee to proceed with your research, this is valid for 2 calendar years from the date approval is issued by the PEC chair. All data collection must be completed within these 2 calendar years. If this time lapses during the course of your project data collection then you must reapply for ethical approval.
16. If your project when conducted does not conform to the project as described in your ethics application then you may be subject to certain outcomes. Depending on the circumstances, these can include a reduction in grade, a capping of the project module grade at a ‘C’, receiving an ‘F’ grade on the module, and/or potential invocation of the IADT Student Disciplinary Procedures.
17. Occasionally students wish to conduct projects on highly sensitive topics which would not be suitable for primary data collection. In these cases the student can consider ‘Green’ route methodologies (e.g. analysis of existing datasets, completing a Rapid Structured Literature Review, or similar). Approval by the PEC for all projects relating to sensitive topics is dependent on an appropriate and willing supervisor being available for such projects, and on the student’s recognition that their pursuance of such a project is not mandatory and that they voluntarily chose such a project. Students should ensure that they are familiar with the supports available to them (for example, the student counselling service) and should ensure that their actions follow relevant legal statutes and requirements at all times. In exceptional cases a student can cease work on projects on highly sensitive topics and prepare a new project idea, although this may result in the need for a deferral or leave of absence in some cases.

Section 0: For Completion by the Supervisor

I confirm that this application to the PEC by _____ (student name) accurately reflects all of the ethical implications in the project.

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

Amber Route __x__

Red Route _____

Signed _____ **Date:** _____

Section 1: Project Information

Student Name: Elizabeth Larez

Student Email Address: N00236153@iadt.ie

Supervisor Name: Naoise Collins

Working Project Title: Personality And Play: What Drives Motivation In Subnautica?

Main Variables Being Investigated: (5) personality traits (openness, conscientiousness, agreeableness, neuroticism, extraversion); and (5) intrinsic motivation factors in gameplay (relatedness, autonomy, competence, immersion and fun)

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 <u>all</u> which apply.

Route Type	**Methodology**	**Tick here**
Green Route (no direct contact with participants required, and no data is collected/recorded which could identify participants)	Theoretical paper / systematic literature review / Rapid Structured Literature Review (RSLR)	
	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.	X
	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	X
	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 ethical consideration)	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	
	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		
	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		
	7	Section 5 (Green Route Projects only)	X	
	8	Section 6 (Amber and Red Route Projects only)	X	
	9	Section 7 (Amber Route Projects only)	X	
	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)		
	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: Elizabeth Larez Date: November 21st 2024

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.**	**X**		
6.2	**I will tell participants that their participation is voluntary.**	**X**		
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.**	**X**		
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.**	**X**		
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.**			**X**
6.6	**I will explain to participants that they can withdraw from the study at any time and for any reason.**	**X**		
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.**	**X**		
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.**	**X**		
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.**	**X**		
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**	**X**		
6.11	**I will obtain passive consent from parents/guardians for studies involving people aged between 16 and 18 years, as well as active**			**X**

	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.**			**X**
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.**	**X**		
6.14	**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.**	**X**		
6.15	**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.**			**X**
6.16	**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**			**X**
6.17	**Is there any realistic risk of any participant experiencing either physical or psychological distress or discomfort?**		**X**	
6.18	**I plan to use animals as part of my research study**		**X**	
6.19	**I plan to tell participants their results on a task or scale which I am using in my research.**		**X**	
6.20	**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)**		**X**	
6.21	**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.)**		**X**	
6.22	**My study involves deception or deliberately misleading participants in some way.**		**X**	

6.23	**My target population includes people who have learning or communication difficulties**		**X**	
6.24	**My target population includes patients (either inpatient or outpatient)**		**X**	
6.25	**My target population includes people in custody**		**X**	
6.26	**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).**		**X**	
6.27	**My project includes the use of any illegal materials or substances as part of the materials for the study, regardless of methodology employed.**		**X**	
6.28	**My project includes the use of any dangerous materials or substances as part of the materials for the study, regardless of methodology employed.**		**X**	
6.29	**My project employs ethnographic or autoethnographic methodologies.**		**X**	

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: Elizabeth Larez Date: November 21st 2024

Section 8: Additional Information For Red Route Projects

8.1 What are the aims of your research? Include your research question and hypotheses for all studies which are not exploratory in nature (Max. 100 words)
8.2 What is the specific reason(s) why this is a Red Route project? (Max. 100 words)
8.3 How will you ensure that participants are not harmed as a result of participation in your research, given your answer to 8.2 above (Max. 100 words)
8.4 Why do you need to do this project at this stage in your career? For example, is there a specific postgraduate programme which you wish to apply for which requires you to have completed research in this area? Do you have specific additional qualifications or experience which equip you to manage the additional ethical implications in this project? Bear in mind that if your main reason for wishing to do this research is because the area of study is important then your application is likely to be refused – in general it is better for research with important societal implications to be conducted at a time when you have more research experience. (Max. 100 words)
8.5 Provide rationale as to why other methodologies related to your chosen topic (such as a systematic review, RSLR, theoretical paper, content analysis, or analysis of an existing dataset) cannot be done in your case (Max. 100 words)
8.6 List supporting documentation which you have included in an Appendix to this application to justify the need for you to do a Red Route project (this might be: the list of entry requirements for a specific postgraduate programme which you are planning on applying for, along with the link to the website where you found this information; a transcript or certificate for a training course related to the area; a letter from your manager or supervisor where you are engaged in voluntary work related to the area, etc.). 1. 2. 3. 4. 5. 6.

8.7 List below the final grades that you received in each module in your most recent completed year of study in IADT (i.e. Fourth year students should provide their 3rd year end-of-year results; Third year students should provide their 2nd year end-of-year results; MSc students should provide their grades to date in each module, 'provisional' grades are acceptable when final grades are not yet available). A Red Route ethics project requires a very high level of competence and attention to detail which we have found often correlates with higher grades in earlier modules. 1. 2. 3. 4. 5. 6. 7. 8.
8.8 Planned Study Design (Max. 50 words)
8.9 Description of Planned Materials (Max. 200 words). All materials should be included as Appendices to this application. Materials include information sheets, consent forms, debriefs, demographic questionnaire, attitude or psychometric questionnaires, intervention materials, score sheets, technical equipment, and anything else that will be used during data collection. If you intend to use a video/game/app/other media, then you must provide the committee with full access to this through a video file or access to the game/app/media.
8.10 Planned Participant Population and Recruitment Method (Max. 100 words)
8.11 Planned Procedure (Max. 100 words)

Section 9: Declaration of a Red Route project

I hereby declare that [all of / this aspect of (delete as appropriate)] my project involves no ethical implications other than those listed and described in Section 8. It involves no risk of physical, emotional, social or cognitive harm to participants other than those outlined in Section 8. It involves no deception other than that indicated in Section 8. I will obtain full informed consent from all participants and provide a full debrief afterwards (using the templates provided) and I will provide

full anonymity and/or confidentiality to participants, except where explicitly explained otherwise in Section 8. Unless stated otherwise in Section 8, 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: _____ Date: _____