

Video Game Addiction, Its Risk Factors, and Relationships with the Big Five Personality Traits

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Abstract: Video games have become the modern way of socialising and entertaining especially among teenagers and young adults. Studies have pointed out the negative outcomes of excessive gameplay. Personality, as one of the main influencers of behaviours, the relationship it holds with video game addiction should be investigated. Personalities are formed because of genetic and environmental influences and the most established classification is the big five models of personality: Openness to experience, Conscientiousness, Extraversion (extroversion), Agreeableness and Neuroticism. Video game addiction falls under the category of behavioural addiction and is formed because of the dopamine effect. 'Flow' state and the Zeigarnik effect are used to explain the mechanisms behind addiction. Some diagnostic symptoms are excessive playtime, preoccupation, and tolerance. People with relationship issues are more vulnerable to Video Game Addiction (VGA). For personality, neuroticism is positively correlated, and conscientiousness is negatively correlated with VGA. Extraversion and agreeableness are negatively correlated with VGA, but this depends on the game genres to an extent. Openness to experience has the least effect on video game addiction. For future studies, game genres are worth investigating as gamers with different personalities may prefer or dislike certain games, which lead to them being addicted or not addicted to this game, this may affect the accuracy of the results. Other factors such as psychopathological conditions and social background are also important.

Keywords: personality traits, video game addition, flow, risk factors, neuroticism

1. Introduction

Advancements in technology in recent years have brought the video game industry to maturity, and video games have become the trending leisure and social pursuits, especially among teenagers and young adults [1]. In the meantime, addictions associated with it have also become increasingly common among gamers and have attracted many researchers' interests [2-4]. Numerous studies have indicated that excessive playing can have many negative consequences. Physically, individuals may experience different levels of wrist, elbow, and neck pain, with some long-term issues such as obesity [5]. What is more dangerous is the harm it can cause to the mental health, social relationships, and other life activities of individuals [6]. Some possible outcomes are depression, anxiety, academic or work failure [6]. Therefore, research aiming at investigating how video game addiction is associated with other factors is crucial as it enhances understanding in this relatively new field.

Personalities have been found to be one of the main determinants for individual behaviours. The big five models of personality are the most used classifications of personality traits. It is categorised into five main aspects: Openness to experience, Conscientiousness, Extraversion (extroversion), Agreeableness and Neuroticism. In terms of video games, personalities are predispositions that can influence the level of engagements of players when playing video games, this can further lead to different playtime, which means that people with certain personality characteristics are more vulnerable to video game addiction than others. For the first part of this paper, a more specific introduction of the big five personality traits will be given, as well as the conceptualisation and explanation of video game addiction, under the branch of behavioural addiction, the mechanisms of how people become so engaged in video games that eventually lead to addiction are also included. For the second part, this paper analyses the diagnostic symptoms of video game addiction, its risk factors, and finally the relationship it holds with each of the five personality traits.

2. Introduction of Investigated Subjects

2.1. Personality Traits

Traits are people's ways of thinking and behaving toward certain situations that allow them to be distinguished from others. In contemporary society, people hold various predispositions that are formed because of genetic and environmental influences, which serve as predictors of future behaviours - a person with fulfilling interactive childhood experiences is more likely to develop into an extroverted individual, which means he/she has a higher tendency toward attending social events. Psychologists tried to group these traits into main categories: the first attempt were by G. Allport and H. Odbert in 1936. Despite a tediously lengthy list which contained 4500 words related to personality traits, it built the foundation to allow other researchers to further investigate the width of personality. The list was later narrowed down to sixteen traits by Raymond Cattell et al using factor analysis, which was already a significant progress in categorising personalities. Psychologists like Fiske, Norman, Smith, Goldberg, McCrae & Costa, after examining the list proposed by Cattell, believed that it can be further reduced to five primary factors of personality [7]. After robust tests and analysis, the validity of the model had been confirmed and became the one people are familiar with today: Openness to experience, conscientiousness, extroversion, agreeableness, and neuroticism [7].

Each element represents a spectrum, and individuals can fall anywhere on the continuum rather than either of the two distinctive extremes.

- Openness to experience

Tendency toward new experience seeking, one's ability of imagination, abstract and creative thinking. People with high openness prefer novelty and variety, they have a higher sensitivity in feelings, they have higher appreciation in arts.

- Conscientiousness

Impulse control abilities, self-regulations. People with higher conscientiousness are more organised, goal-oriented, and self-disciplined.

- Extroversion

Tendency toward social interaction with other people. People with higher extraversion are more sociable, they are outgoing and are comfortable being the centre of attention.

- Agreeableness

Ability of social interaction, tendency toward cooperation. People with high agreeableness can communicate well with others, they prefer collaborative work rather than competition.

- Neuroticism

Emotional stability, people with high neuroticism are more emotionally unstable, usually perceive events in a negative way, and experience anxiety and other negative emotions frequently.

2.2. Behaviour Addiction

Any behaviour can be addictive in nature, as long as it satisfies the following properties [8]:

- Salience, which might appear as preoccupation or yearning, refers to the phenomenon of addictive behaviour becoming the most significant activity in a person's life.
- Mood modification, or coping, which refers to subjective augmentation like getting high or reducing unpleasant affect.
- Tolerance, referring to the requirement to increase the frequency, length, or quantity of an addictive behaviour in order to achieve the same results.
- Withdrawal symptoms, characterised by unpleasant physical and mental side effects brought on by stopping an addicted behaviour.
- Conflict, which develops as a result of continuous engagements in addictive behaviours, that can be either interpersonal or personal.
- Relapse, which is the return to earlier levels of engagement after trying to cut back on an addictive behaviour.

British psychologist Mark Griffiths and his team conducted more than 500 behavioural addiction surveys and compiled 83 studies with 1.5 million respondents from four continents in the world. The studies covered addiction to gambling, sex, shopping, internet, exercising and work, as well as alcohol, nicotine, and drug addiction. It has been concluded that 41% of the world population had at least one behavioural addiction, which suggested that they are more common than people would think. Up to 40% of the Americans experience some form of internet addiction. In the meantime, studies have shown that 48% of American college students are internet addicts, with another 40% on the borderline.

2.2.1. Video Gaming Addiction

In an increasingly digital era, video gaming addiction has become one of the most destructive behavioural addictions that can severely harm one's personal health and interpersonal relationships. Fundamentally, there is no essential difference between VGA and any type of drug addiction: the reward centre in the brain releases dopamine which reinforces the behaviour [9]. In video games, the hyperarousal caused by intense fighting scenes or the pleasurable experience of successfully unlocking a hidden achievement triggers the release of chemicals, and over time the desire to obtain this experience leads to intense playing as a result.

2.2.2. Flow

Psychologist Mihaly Csikszentmihalyi proposed the idea 'flow' that may serve as an explanation for the addictive behaviour. Flow described 'a state in which a person is fully immersed in an activity that nothing else seems to matter' [10]. He described the eight characteristics of flow as:

1. Complete focus on the assignment
2. Having clear objectives and rewards, as well as immediate feedback
3. The passage of time
4. The experience itself is satisfying
5. Effortlessness and ease
6. Mix of challenges and capabilities
7. Actions and awareness become one, losing self-conscious rumination
8. Presence of the sense of control over task

When people are playing games, these seem to be accurate descriptions of their conditions. FPS games require complete focus on the screen as opponents may appear in any place and direction; MOBA games have clear objectives of destroying the enemies' turrets and the feedback is the score you have for this game; People tend to feel time speeding up when playing games; Play games allow

us to feel the sense of achievements which is rewarding, different people play different games for various expected outcomes; people practise their skills in early game and later master it to win; people completely focus on the character and imagine themselves as he/she; people control the movements and actions of character to proceed the game and achieve desired results. Because of the nature of the settings of video games, they almost pull gamers into the 'flow' state easily and this creates a high level of neural excitement and sense of fulfilment, which inhibits effective self-control.

2.2.3. Zeigarnik Effect

The Zeigarnik effect, named after Lithuanian-soviet psychologist Bluma Zeigarnik, theorised that completed tasks are not remembered as well as tasks that were paused or left unfinished [11].

When people play MOBA games, there are a group of players that share the goal of climbing up the ranks, bronze level players want to be promoted to silver, silver level players want to be promoted to gold, etc. However, the settings of the games are to make people slowly progress, and it is common that after a night's effort, the rank did not go up, instead it went down. This pushes people to impulsively play until they accomplish their unfinished goal.

Similarly, role playing games offer players dozens of unfinished tasks, in the form of 'Side Quests. Many characters request help from the players in solving their own problems. Take The Elder Scrolls V: Skyrim, a Lord of the Rings for example, tasks vary greatly from 'find 24 hidden gems and give it to the merchants' to 'save my cat from the treetop' to 'assassinate the king'. Some take longer than others to finish, and what keeps players playing is that there is always a new quest coming up when the player is trying to finish the current one, and they have unconsciously fallen into 'The Arbitrary Endpoint Trap'.

3. Diagnostic Symptoms of Video Gaming Addiction

The diagnosis criteria of behavioural addiction can also be applied to VGA, in a more specific sense. It is fundamentally the gamers' inability to establish effective controls over their gaming habits, which lead to consequent emotions and behaviours displayed in everyday practices. Hence, the following traits can be observed to distinguish game addicts and normal players [12].

3.1. Excessive Playtime

In fact, for all people with behavioural addictions, it is almost impossible to control addictive behaviours. For game addicts, although they usually choose to indulge themselves in the beautiful virtual game world, it is not easy to control or end this habit, even if they know the harm. Some use it to escape the challenges and responsibilities of real life, while others simply enjoy the thrill of the game [13]. Regardless of the cause, this can lead to excessive playtime. One must play video games for a minimum of fifteen to twenty hours a week or more for them to be considered addicted. This equates to three hours every day on average.

3.2. Preoccupation

Gaming time alone cannot fully categorise VGA, this is because while games serve as a hobby for most people, some rely upon it for living. In fact, research has shown that professional video game players can play up to 80 hours or more a week. what is consequent for excessive game playing is preoccupation - not only they are constantly thinking about the previous online gaming activity, but also anticipating future sessions, which leads to serious disturbance to everyday life [12]: indulging in the game world not only means less interaction with family members, classmates, and friends, but the chat topics between them and others are also likely to be limited to games. Conversely, if a person

suddenly fades out of his/her usual social circle, and only pays attention to games, he/she may have VGA.

3.3. Tolerance

Another symptom to be considered is tolerance, this means an increasing amount of time needed to achieve desired effects and escalating commitment to gaming activity to achieve the desired excitement [12]. Gamers are often willing to accept increasing efforts as the game progresses, in the purpose of finishing the main quest. Fundamentally, this is because they think the sense of achievement is worth the dedication. However, this is only limited to a certain extent. Unlike rational gamers who are always making cost analyses, people with VGA will not quit playing even when objectively the level of satisfaction is inadequate to motivate the behaviour.

3.4. Withdrawal Symptom

When players are separated from video games, they often show withdrawal symptoms such as mood swings, irritability, or depression – this is due to the lack of other motivational forces in life [12]. In the long term, the dopamine mechanism from the reward system in the brain creates a dependence on gaming to acquire pleasure. Low levels of dopamine make people less excited and motivated about things and have been found to be associated with several psychological disorders such as depression. Players may also suffer from concentration problems, which is predominantly because they have been disconnected from the real world for too long that they cannot focus on anything else but games [14].

3.5. Escape from Reality

Some people turn to games to avoid addressing negative emotions, others use it as a tool to escape from the cruelly challenging world [12,13]. By creating a world with gripping stories, unique settings, and characters with different personalities, it easily immerses the players in the virtual environment, allowing them to temporarily relieve the external pressures. This irresistibly attractive virtual world makes people feel so much better than the real one. people can become the richest person, the best killer, the greatest sportsman, or basically anyone they wish.

3.6. Conflict

Choosing to spend most of the time on games means neglect of other responsibilities and tasks, which can have negative impacts on one's academic achievements, work performances and interpersonal relationships [12]. Robust literatures have found that VGA often leads to low academic achievements [15,16]. People who are game addicts also display more destructive behaviours such as arguing or even fighting. This is because chatting with characters in games does not necessarily represent communication in everyday life. In extreme cases, this can lead to antisocial personalities and corresponding behaviours, which can have serious implications on the society.

4. Risk Factors of Video Gaming Addiction

As a product of the new era, video games have a more profound effect on teenagers [17]. This is because teenagers have been in contact with the Internet for a longer time than other age groups, so they are more likely to be addicted to the online games. Teenagers seek more exciting experiences generated by stimulation and have a higher need to express their emotions. Various studies have found that teenagers are particularly vulnerable to game addictions because of their still-maturing brains and the need for affiliation. Almost every study aiming at game addiction will investigate the sample of adolescents or university students. Apart from age, other researchers have found that gender may

be another important factor [17]. In the participants gathered by Hyun in 2015, there were 255 male game addicts, with only 3% of participants being female. In the meantime, a study done by Ko et al revealed that there are more male game addicts than female game addicts, which could be explained by the pursuit of the feelings of achievements [18].

Other factors such as family environment, social interaction and self-esteem also contribute significantly to video game addiction [19].

4.1. Relationship Issues

Many empirical studies have found that adolescents with a poor family relationship are more likely to suffer from VGA, others found a link between single-parent families and VGA [20,21]. Parents are the first objects of learning for children. If the family atmosphere is full of quarrels and disharmony all day long, it will be difficult for children to maintain a healthy relationship with classmates and friends in the future, as they lack the ability to effectively communicate and to respect others' opinions. This can also lead to the inability of teenagers to establish intimate relationships to maintain emotional balance, which makes them unable to seek real-life comfort when encountering difficulties and setbacks; at this time, a patient and friendly in-game character can easily make the children devote themselves to the online world and vent their emotions in the fast-paced exciting game environments.

4.1.1. Expectation Settings and Parenting Styles

It is common for parents to have a high expectation for their children. However, in some scenarios the expectations and demands placed on children are beyond capabilities, basically, they are unrealistic standards that will only lead to pressure being added on to children. Children cannot fulfil the requirements of their parents, but what pushes them to the virtual game world is the dissatisfaction of parents that eventually turned into punishments, and the refusal to show understanding and the willingness to communicate. The children deem themselves incompetent and worthless due to parental pressure, so they seek recognition in games: there are always people waiting for them to save, and the characters are never stingy with praise.

It has been found that the level of communication between children and parents can have a significant impact on their future gaming behaviours [20,21]. As the first learning environment that children encounter, the guidance of parents in daily behaviours is undoubtedly important. Studies have found that the more contact between parents and children the less likelihood of children developing into gaming addicts in adolescents. It is also necessary for parents to guide their children's daily playtime in a more gentle and indirect way. Especially with teenagers, being too harsh is only going to be counterproductive because they are going through a very rebellious period. The child can be addicted to games, and the parents can be addicted to controlling. As the child grows older, the parent should give some degree of freedom and control over their lives accordingly. Studies have found that children who are respected for their freedom are less likely to indulge in the game world [22]. Conversely, if children cannot feel the freedom they desire in the family, then an open world survival game with a high degree of exploration and development is likely to make them addicted.

4.2. Social Relationships

On the one hand, it is difficult to a person with many friends in real life and have a good social circle to become addicted to games [23], this is mainly because they have a fulfilling daily schedule and do not need to seek happiness and satisfaction in online games. On the other hand, it is very difficult for a person who has friends that are heavy game enthusiasts to not be addicted to games, whether it is because of the need to maintain a friendship, or simply due to the influence of friends.

4.2.1. Games as a Medium for Building and Maintaining Friendship

Many game companies are trying their best to combine the game itself with socialisation, as this will enable them to gain and retain more players. Old players will recommend new friends to play, and those who have already started are likely to stay active because of their friends. Games are a very popular form of entertainment among young people, and it also makes it much easier for people to make new friends and connect with each other. As the most popular mobile MOBA game in China, Glory of Kings makes it very easy for people to find users with the same hobbies as themselves and become good friends after simple chats and a few good rounds of game. From another perspective, it is easy for people to uninstall any software on their mobile phones, but they cannot easily remove these social relationships. The same applied for the purpose of maintaining friendships. The concept of social influence has pointed out that people will adapt their behaviours and perspectives as the same as the majority if there is something that they value. In this case, it is the friendship that is important to the individual, this slowly drags people into the game, and may result in addiction.

5. Personalities as Predictors for Addictive Behaviours

5.1. Openness to Experience and Video Gaming

There is mixed evidence on the correlation between openness and VGA. While numerous studies have indicated a negative correlation between them [24-26], while others believe it has the least recognisable relationship with online gaming [27].

5.2. Conscientiousness and Video Gaming

Low level of this personality trait is the most significant predictor of VGA [26,28]. People with low level of conscientiousness are more vulnerable to VGA because they are less conscious with the flow of time, this is saying they may lack time management skill, people with low level of conscientiousness tend to be less goal-oriented, they may procrastinate more and if there is distractive event e.g. exciting video game. They may easily abandon their current tasks whether it is academic or work or relationships.

5.3. Extroversion and Video Gaming

Introverts favour online gaming because of the anonymous environment it provides. The anxiety from attending social activities can be alleviated as video gaming serves as an alternative to face-to-face communication that the introverts would normally avoid [28]. However, this finding is not consistent - some have reported no link between VGA and level of extroversion, others indicated that extroversion may lead to violent game use [4,24,29]. Among all game genres, Role-playing games typically offer opportunities for introvert players to experience various roles they would not be able to access otherwise. However, studies have shown that players of RPG are not all introverts - some extraverted individuals are excited for the interactivity and socialising elements of the games [30]. Certain game types allow extroverted gamers to gain the same pleasure that they would normally gain from attending social events, but generally the satisfaction is inadequate for these people to become addictive.

5.4. Agreeableness and Video Gaming

Low agreeableness was associated with VGA [2,24-29]. This is reasonable as for one to immerse in the digital game world, one must abandon real life interaction with others to an extent. This is contradictory to social harmony as people's face-to-face communication should be encouraged.

People high in this personality trait seek to avoid conflict. This means that they may dislike game genres that involve high level competition among players, such as intense FPS or MOBA games. However, they still have the likelihood of getting addicted to games where cooperation is required (like MMORPG).

5.5. Neuroticism and Video Gaming

People with high neuroticism are less successful in real-life interactions due to the fact that they experience more negative emotions than ordinary people, they also tend to be less emotionally stable which may also harm their relationships with others. Studies have found that people with high neuroticism are more likely to suffer from VGA [2-4,24-28]. Hughes et al. in 2012 further explained this behaviour as avoiding loneliness and anxiety and creating a sense of group belonging [31]. This may also provide an explanation of why neurotic individuals engage highly in video games. They may devote themselves in games that are heavily interactive, to seek the pleasurable experiences that they could not receive in real life otherwise. By entering the digital game world, neurotic individuals can be relieved from the negative emotions perceived from the real world, concentrating on quests in game also act as a stabiliser for their shifting moods.

6. Discussion and Suggestions

6.1. Summaries

VGA has been found to affect adolescents and young people more than other ages, predominantly because their daily internet usage creates the vulnerability of meeting video games; high levels of social engagement also play a role. Many risk factors can impact one's likelihood of problematic gaming, with family environment and need for social approval. The big five personality traits are also influential predictors for potential future addictive behaviours. High neuroticism and low conscientiousness were found to be associated with VGA in particular [32]. Majority of studies have also indicated a negative relationship between agreeableness, extroversion, and VGA, despite some contradictory findings. A study has pointed out that some game genres can have a profound effect on individuals with high agreeableness, while individuals with low agreeableness may show trivial effects [33]. In comparison, openness has the least recognisable association with VGA, but there is mixed evidence on this trait as well.

6.2. Suggestions and Possible Future Direction

Although it has been corroborated by many that the impulsive use of video games can lead to addiction regardless of game genre, certain types of games can be more addictive in nature than others.

Different game genres serve different people based on their preferences and personality traits. According to a study conducted by Try Evidence, a research firm, people's gaming behaviours and preferences can depend on intelligence, cognitive styles, temperaments, abilities, or personality traits [34]. For example, extroverts tend to prefer First Player Shooting games, Action of Fighting games, agreeable people tend to enjoy adventure and collaborative games, openness to experience is associated with a preference for role-playing games [34]. A study conducted by Shiroh Ohno found that the battle royale game genre, which includes games like Fortnite and PUBG, was associated with aggressive feelings, gaming addiction, and a sense of underachievement [35]. The study recruited Japanese students who play online games frequently and found that battle royale game genre was the only variable associated with aggressive feelings; it showed a statistically significant correlation with gaming addiction. Another study conducted by Centro Escolar University Makati found that the video game genres that were most strongly correlated with gaming addiction among grade 12 Sciences,

Technologies, Engineering, Mathematics, Accounting, Business and Management students were action, adventure, driving, miscellaneous/casual, role-playing, and sports [36]. These studies indicated that certain game genres may be naturally more addictive than others, this can be potentially explained by the game settings and backgrounds dragging players into the 'flow' state more easily. The relationships between personality traits and tendency towards certain game genres require further investigation, and the effects of game genres on VGA remain unclear. Whether there is a causal relationship between game genres and VGA is uncertain, it can also be explained by the fact that the popularity of some game genres such as FPS and RPG mean that there will be more people becoming addicted to them in terms of quantity. Studies in this direction are necessary to be carried out in the future to enhance understanding of this field.

Secondly, the big five personality traits are only partial predictors for addictive gaming behaviours, other factors such as psychopathological conditions and social background are also important. People are not only limited to one trait in the OCEAN personalities, but they can also be high in one trait while low in another, as the big five personality traits are multifaceted and are designed to cover different elements in one's personality. This means that they can have one personality trait being positively correlated with VGA, while another is negatively correlated with VGA. According to a study published in the journal *Frontiers in Psychiatry*, the element of social interaction has been found to predict gaming disorder. The study found that the association between interaction in games and VGA was mediated by online social capital. Moreover, individuals who displayed high alienation have found to be more influenced by the effect of online social capital on gaming disorder than individuals who displayed low alienation [23]. Another study conducted by researchers at the Chinese University of Hong Kong found that leisure ennuui was associated with intense game playing, and one's level of loneliness and self-control can predict mobile social game addiction accurately. [37]. It has also been found that there is a negative association between VGA and perceived social support [38]. This suggests that people who lack social support or who have few social connections may be more likely to turn to video games as a way of coping with stress or loneliness. All above factors can increase the risk of developing game addiction, hence longitudinal studies that take considerations of other risk factors are important, though at the cost of time and potential ethical implications.

7. Conclusion

This paper focused on the risk factors of developing video game addiction and how the big five personality traits can contribute to potential VGA. Unsuccessful real-life experiences and relationships push people into the game world as it enables them a new chance to write their stories and become successful. Many also use games as a tool to maintain their friendships with others but later become addicted themselves. As analysed, VGA is positively correlated with high neuroticism as emotionally unstable people use video games as a tool to temporarily escape from reality; and it is negatively correlated with high conscientiousness because goal-oriented people will consistently pursue their goal and not let themselves be distracted from short-term pleasure. Extraversion and agreeableness are negatively correlated with VGA, but this depends on the game genres to an extent. Certain game types cater the social needs of extraverted individuals, while other games allow introverted people to take different roles in society that would be otherwise inaccessible to them. Agreeable people strive for a peaceful and stable society, this means that they may dislike violent games that are contradictory to societal harmony; on the other hand, they may enjoy playing collaborative games or RPGs where the aim is to help different characters in the game. With substantial knowledge on this topic, parents and teachers should communicate with the children more to set reasonable targets and guide the children to obtain the balance between pursuing goals and releasing stress. Future studies should be conducted to explore and reveal the role of game genres and other factors in VGA.

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