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Research Article

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Attentional Bias and Reactive Attacks in Video Game Player

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Abstract

Video games are widely popular their impacts on player addiction are thus intensively investigated. Considering the importance of reward in addiction, this study investigated whether high penalty feedback has a promoting effect on the maintenance of the reward value of the game stimulation. In Experiment 1, the characteristics of attentional bias of game stimulation were tested using the dot-probe task paradigm. In Experiment 2, changes in the heart rate of game players and non-game players during the game were compared to investigate the physiological activation state of the game players. In Experiment 3, the impacts of different penalties on the aggressive behavior of game players were analyzed. Our results showed that long-term game players exhibited attentional bias toward the game stimuli, which was mainly reflected in terms of the orientation characteristics of attention; during a game, the player's high physiological activation helped the game stimulus to maintain the reward value in the habitual level. High intensity penalty feedback can maintain the reactive attack state of game players, which helped to maintain the players in a state of high physiological activation during the game. From the perspective of "learning in games" in the Confucian culture, the approach and content of video games must be actively improved.

Keywords: Video game; Addiction; Attentional bias; Punishment-aggression; Heart rate

Introduction

In the 2000s, online games became popular. In 2012, more than one billion individuals played computer games, which fueled growth of 8% in the computer gaming industry in the same year. A recent report by the market research company Niko Partners has estimated the People's Republic of China's online gaming market at $12 billion in 2013 [1]. Not only are online games highly popular, but in 2003, the General Administration of Sport of China announced electronic gaming as the 99th event for sports competition. On April 17, 2016, the Olympic Council officially announced that e-sports will be an official event in the 2022 Hangzhou Asian Games [2]. However, unlike any other sport, online gaming has received both praise and blame since its emergence. Indeed, players can improve their communication skills through the games, expand their circles of friends [3], and achieve aims not achievable in real life such that they can release pressure and achieve a sense of accomplishment [4,5]. Concurrently, however, a growing number of studies have indicated that Internet gaming addiction is associated with various negative consequences [6]. The psychological consequences include: sacrificing real-life relationships, other pastime activities, sleep, work, education, socializing, and relationships, obsession with gaming and a lack of real-life relationships, lack of attention, aggression and hostility, stress, dysfunctional coping, a deterioration in academic achievement, problems with verbal memory, a low level of well-being and high level of loneliness [7]. The findings provide support for the current perspective of understanding Internet gaming addiction within a disease framework. Internet gaming addiction shares similarities with other addictions, including substance dependence, at the molecular, neurocircuitry, and behavioral levels [8]. Adolescents who expose themselves to greater amounts of video game violence are more hostile, report getting into arguments with teachers more frequently, are more likely to be involved in physical fights, and perform more poorly in school [9].

Addiction is conceptualized as a cycle of decreased function of brain reward systems and recruitment of anti-reward systems that are progressively diminished, resulting in the compulsive use of drugs. The concept of an anti-reward system was developed to explain one component of time-dependent neuroadaptations in response to excessive utilization of the brain reward system [10]. In addition, there are the objective changes observed in the brains of animals and humans who have undergone repetitive use of addictive chemicals [11]. Therefore, an in-depth study of the continuous process of online games and an analysis of the factors shaping players' reward systems are of key importance.

Game stimuli are closely related to visual attention processing. Attentional processes play an important role in the processing of emotional information [12]. Attentional mechanisms allowing the rapid detection of sources of potential environmental threats are therefore presumed to afford an obvious survival-facilitating mechanism. However, an attentional function equally integral to the biological fitness of organisms is to orient toward stimuli of potential reward value in the environment [13]. Research data has shown that game players do not exhibit attentional bias only to game-related clues Feng and Metcalf [14,15], investigated whether an attentional bias for gaming-related words existed for addicted Massively Multiplayer Online Role-Playing Gamers (MMORPGers). The results indicated that addicted MMORPGers had significantly longer response times to negative and MMORPG words compared to neutral words, whereas highly engaged and non-MMORPG participants showed no such bias. Visual stimuli are hypothesized to be analyzed following two separate coactive and interactive routes: standard visual-processing pathways, for the elaborative identification of salient visual properties that primarily function to orient the organism toward positive and potentially rewarding stimuli in the external environment, and a threat-detection route, for rapidly identifying the 'safety' relevance of stimuli [16]. Rewarding attention may strongly influence dysfunctional attention biases [17].

An experimental paradigm that is potentially suitable for comparing the attentional processes involved in emotion perception in

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humans and nonhuman animals is the dot-probe task, first described by Macleod et al. [18]. This task is implicit, does not require instruction, and participants need no or minimal training to perform the test successfully [19]. In the dot-probe task, two stimuli are simultaneously displayed, each one on a different side of the screen. One or both of these stimuli have emotional value, for example, one represents a face with an angry expression and the other a face with a neutral expression. The presentation of these two stimuli is followed by an emotionally neutral task, which involves the detection or discrimination of a probe in the location of one of the stimuli [20]. Participants are instructed to press a response button immediately upon perceiving the probe, and their response time is recorded. A methodological assumption of this task is that participants' response time will vary across trials partly as a function of the stimulus to which they were attending at probe onset. Specifically, participants are thought to be faster at detecting probes appearing in the location of stimuli that they were viewing at the time of probe onset, relative to probes replacing stimuli in an unattended visual field because of the additional time required to shift one's attention toward the location of the probe in the latter condition. The dot-probe task can be used to investigate which stimuli are relevant and attract species-specific attention [17].

From the perspective of evolution, the reward value of the stimuli usually stems from its evolutionary fitness, that is, it fulfills some adaptive function. However, addiction behavior itself does not have a positive value orientation, and it may also damage other social functions. How does the stimulus have a positive reward value? It is necessary to develop an in-depth understanding of the meaning, context, and practices associated with gaming [7]. Does the habitual high physiological input mechanism enhance the reward value of the game stimuli? The study of the impact of violent games on the physiological arousal level of players has shown that, compared with casual games, violent games can lead to an increase in players' heart rate and blood pressure [21]. Other studies have also shown that a large amount of dopamine is released in adult men during game play Koepp et al. and Mathiak [22,23], used fMRI technology to show that the violent content in games could activate the cerebrospinal site of players and inhibit the activation of the anterior cingulate gyrus. From the perspective of symbolic learning theory, the enhancement of physiological activation may synchronously increase the reward value of symbolic information.

From the game design perspective, which factors of the game are conducive to maintaining players' high physiological activation mechanism? Meifen and Shunpeng [24] found that indulging in online games affects players' internal aggression. Kuntsche [25] surveyed over 4,000 Swiss adolescents and found that over-watching violent television and playing video games increased the infractions and aggressive behavior of the adolescents. Yongle et al. [26], examined whether players' aggression was affected by different styles of games, and the results showed that violent content affected players' awareness, language, behavior, and emotions. Anderson and Carnagey [27] found that game players' aggressive behavior was largely influenced by the violent factors in the game. These studies emphasized the impact of game stimuli on reactive aggression of the game players, but from the perspective of the psychological mechanisms of addiction, addiction is a strong desire to take the initiative to continue aggression, so what factors lead to this motivational change? Based on the penalty-aggression theory, this study further discusses the influence of penalty-setting in the game on long-term players' reactive aggressive behavior. According to the penalty-aggression theory, the higher the intensity of the punishment, the more aggressive the behavior. The existing information indicates that corporal punishment exerted an average effect size of 36 on the measures of aggression collected during childhood [28,29]. In summary, this study aimed to comprehensively investigate whether the penalty mechanism set in a game is conducive to maintaining the high physiological activation state of the game players through three experiments, and the high physiological activation state can enable the game stimulus with the reward value through the habitual effect. Experiment 1 examined the impact of e-sport games on long-term players' attentional bias, and our study assumed that the object of attentional bias in long-term electronic game players changes regularly. Experiment 2 compared the difference in the heart rate of long-term players and non-game players during the game to verify whether the long-term players showed characteristics of high physiological input. Experiment 3 investigated the impact of the penalty factor in the game design on the reactive aggressive behavior of long-term players, and the study assumed that the higher the intensity of the game penalty, the stronger the corresponding reactive aggressive behavior of the long-term players.

Experiment 1

The subjects of the experiment

Using a survey questionnaire, 30 game players with extensive gaming experience who had played the games "League of Legends" and "King of Glory", which were used in this study, for over six months were selected, and 30 non-game players without any gaming experience were also selected as the control. All subjects were male, aged 18-22 years (SD=19.65), with no history of major diseases, and normal or corrected vision. They were all right-handed. The subjects had not participated in any other similar experiments.

Experimental design

A mixed experimental design of 2 (subject type: game player, non-game player) × 3 (position of the dot for detection: consistence, inconsistence, neutral-neutral) was used. The subject type was the inter-subject variable, and the position of the dot for detection was the intra-subject variable. Consistence of the dot position for detection signified that the position of the dot for detection and the position of the hero image appearing in the game were at the same place; inconsistence indicated that the position of the dot for detection was not on the same side as the hero image. Two neutral images were paired as a benchmark time to test the player's attention. The dependent variable was the response time of the subject to the position of the dot for detection under the stimuli in different positions by key pressing.

Experimental materials

The experimental materials included 40 game images (the hero images in the game "League of Legends") and 40 non-game images (such as a table and a chair, keyboard and other common items). Each image had a height of 4 cm and a width of 3.2 cm. To avoid an impact of the two types of images on the subject's due to physical characteristics, 50 images of heroes in the game were first selected, and then the non-game (neutral) images were selected, whose contrast and brightness were adjusted using Adobe Photoshop CS4 software to match the game images'. To ensure the effectiveness of the images, the 40 images with the highest recognition rate in the preliminary experiment were selected as the stimulus images for the actual experiment. The results of the preliminary experiment showed that the rate of correct recognition of the game images was 95.12%, and the rate of correct recognition of the neutral images was 97%. There was no significant difference in the correct recognition rate between the two types of images (Figures 1 and 2).

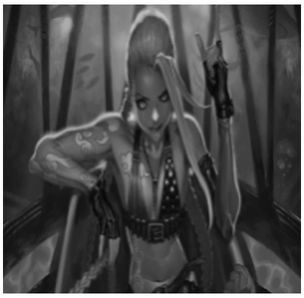

Figure 1: An example of a hero image in a game.

Figure 2: An example of a non-game image.

Experimental procedures

The experiment was performed using the dot-probe task paradigm. First, the information of the subjects was verified, and the experimental equipment and requirements were introduced to them. Then, the subjects performed 20 practice experiments. The correct rate had to reach 95% or higher before the actual experiment. The images used in the practice experiment were not related to those used in the actual experiment, but the experimental procedure was the same as in the actual experiment. In the actual experiment, the introduction was first displayed, followed by a red gazing dot on the white screen "+" 1000 ms; then, the stimulus images simultaneously on both sides for 500 ms, with a 3.5 cm space between the two images. After the stimulus images disappeared, the dot for detection (●) was immediately presented at the position corresponding to the left or right image. The subject was asked to make a quick judgment when seeing the dot for detection. If the dot for detection appeared in the position of the left image, the "F" key had to be pressed with the left index finger. If the dot for detection appeared in the position of the right image, the "J" key had to be pressed with the right index finger. If the subject did not respond, the dot for detection disappeared after 5 seconds, and the next test started. The actual experiment included three blocks (the dot for detection at the same position as the game image, the dot for detection on the opposite side of the game image, the dot for detection appearing after two neutral images). Each block included 40 tests, for a total of 120 tests. The blocks appeared in order, and the tests were randomly presented. The image pairing was carried out as: hero image - neutral image (H-N), neutral image - neutral image (N-N); the consistence of the image with the target as: H-N consistence, H-N inconsistence and N-N. The N-N test served as the baseline time to measure attention.

Result analysis

The errors of all the tests were no more than 3%, so all data were valid.

Difference of the response time on the tested images in different types of subjects

The response times of the subjects were repeatedly measured using the 2 (types of the subjects) × 3 (positions of the dot for detection) tests. The variance analysis showed that the main effect of the subjects was significant, that is, the response time of non-game players (342.37 ± 13.39) was significantly longer than that of the game players (317.08 ± 14.28), $F(1,58) = 6.98$, $P=0.011$. The position of the dot for detection was significant, $F(2,116)=12.55$, $P=0.000$, $\eta_p^2=0.36$, that is, the response time of the subjects under the consistent condition (317.08 ± 14.28) was significantly shorter than that under the inconsistent condition (345.75 ± 27.42). The interaction between the position type of the dot for detection and the type of the subjects was significant, $F(2,116) = 6.51$, $P=0.002$, $\eta_p^2=0.29$. Further simple effect analysis found that for the game players, the response time for the consistent position of the dot for detection was significantly shorter than that for the inconsistent position, $P<0.001$, that is, the game players exhibited an attentional bias toward the hero images. For the non-game players, there was no significant difference in the response time under the two conditions, $P>0.001$, that is, non-game players did not exhibit attentional bias toward the hero images (Table 1).

Attention bias, attention orientation and attention release

Attention bias, attention orientation and attention release scores were calculated based on the algorithm in [30]. The attention bias score = (the average response time for the inconsistence test) - (the average response time for the consistence test), measuring the attentional bias of the subjects to the target stimulus. The attention orientation score = (the average response time for the neutral test) - (the average response time for the consistence test), measuring whether and how quickly the target stimulus could attract the attention of the subjects. The difficulty of attention release score = (the average response time for the inconsistence test) - (the average response time for the neutral test), measuring whether the impact of the target stimulus on the attraction of the subject was sufficient to affect the individual's attention to other stimuli (Table 2).

The attention bias, attention orientation and attention release scores for the game players and non-game players were compared using a single sample T-test. The results showed that the game players' attention bias and attention orientation scores were significantly greater than 0, that is, the game players exhibited attentional bias toward the images of the game heroes, which was reflected in attention

Type of subject	H-N consistence	H-N inconsistence	N-N
Game players	317.08 ± 14.28	345.75 ± 27.42	340.17 ± 22.36
Non-game players	342.37 ± 13.39	348.20 ± 29.71	344.00 ± 20.47

Table 1: Average response time of different subjects in the three different consistence conditions of the image and the target (M ± SD) ms.

Type of subject	Indicator for attentional bias	N	M	SD	t	p
Game players	Attention bias	30	28.66	29.28	5.36	0.000
	Attention orientation	30	23.08	20.61	6.13	0.000
	Attention release	30	5.57	35.10	0.87	0.391
Non-game players	Attention bias	30	5.83	27.49	1.16	0.255
	Attention orientation	30	1.63	22.20	0.40	0.690
	Attention release	30	4.20	27.72	0.83	0.413

Table 2: Descriptive statistics and differences tests of the subjects' attention bias, attention orientation, and attention release.

orientation. In contrast, the non-game players showed neither attention bias nor attention orientation toward the images of the game heroes. The attention release scores for both groups of subjects were not significantly greater than 0 that is, neither the game players nor the non-game players showed any difficulties with attention release from the game images. The differences in each of the attentional bias indicators between the game players and the non-game players were compared using an independent sample T-test, and the results showed that the attention bias score of the game players (28.66 ± 29.28) was significantly higher than that of the non-game players (5.83 ± 27.49, t=3.11, df=58, p=0.003, d=0.82), indicating that the game players exhibited attentional bias characteristics with regard to the images of the game heroes. The attention orientation score of the game players (23.08 ± 20.61) was significantly higher than that of the non-game players (1.63 ± 22.20, t=3.87, df=58, p=0.000, d=1.02), indicating that the game players exhibited attention orientation characteristics toward the images of the game heroes compared with the non-game players. The attention release scores of the game players (5.57 ± 35.10) and the non-game players (4.20 ± 27.72) showed no significant difference.

Experiment 2

The subjects of the experiment

A total of 30 subjects were selected from those in Experiment 1, including 15 game players and 15 non-game players.

Experimental design

A mixed experimental design of 2 (subject type: game player, non-game player) × 2 (heart rate recording period: calm period, game period) was used. The subject type was the inter-subject variable, and the heart rate recording period was the intra-subject variable. The dependent variable was the heart rate of the subjects during the calm period and the game period.

Experimental instruments

The experimental instrument used in this experiment was an MP15016 multichannel physiological detector to make an electrocardiogram (ECG) reading of the subjects. An Apple 6s cell phone with the accompanying headphones was used for the operation of the games by the subjects.

Experimental materials

In this experiment, the mobile game "King of Glory" was used. The operability of "King of Glory" was evaluated in the pre-experiment by 7 senior game players who were not the subjects of this study. The character of "descendant" hero of this game was selected for this test, with a familiarity of the game character of 100%.

Experimental procedures

Before the experiment, the experimental equipment was introduced to the subjects, and then the subjects were informed regarding the basic experimental procedures and requirements, and it was clarified that the instrument would not have any impact on or damage the subjects. Next, electrodes were affixed to the left wrist and both ankles of the subject, with the positive electrode of the multichannel physiological detector connected to the left wrist, the negative electrode connected to the left ankle, and the ground line connected to the right ankle. The experiment was divided into three parts. First, the subjects' baseline heart rate was measured. After connecting the experimental instrument, the subject was comfortably seated with eyes closed for 5 minutes, and the baseline ECG level was measured after 1 minute in the calm state. After the test, the subject rested for 2-3 minutes. Lastly, the subject was asked to maintain the previous seated position, and wearing a headset the subject manipulated the selected specific game hero "descendant" to kill a monster to level up in the game. The background music and the sound effect of fighting could be heard during the game. A game lasted approximately 25 minutes, and the heart rate at approximately 13-18 minutes into the game was selected as the data to be collected.

Results analysis

The data were collected and processed using an MP15016 multichannel physiological detector (BIOPAC MP150) and its accompanying software Acq Knowledge 4.1. The processed data were input into SPSS17.0 for further statistical analysis.

The difference in the heart rate of the two types of subjects

The data of Experiment 3 were subjected to variance analysis for the repeated measurement of 2 (subject type) × 2 (test period). The results showed that the main effect of the subjects was not significant, F (1,28) =0.02, p=0.886. The main effect of the test period reached the significance threshold, F (1,28) =3.38, p=0.076, η_p^2=0.108, that is, the in-game heart rate was significantly greater than the baseline heart rate. The interaction between the test period and the type of subject was not significant, F (1,28) =0.02, p=0.886. Furthermore, the heart rates of the two groups of subjects in different periods were compared using a T-test, and the results showed that the heart rates of the game players in-game (81.23 ± 8.08) and in the calm period (77.97 ± 6.05) were significantly different, t=-2.96, p=0.01, d=0.48, while the heart rate of the non-game players in the two states were not significantly different, t=0.01, p>0.5, indicating that the heart rate of the game players in-game had a higher level of input (Table 3).

Experiment 3

The subjects of the experiment

The subjects for this experiment were the 30 game players in Experiment 1.

Experimental design

A mixed experimental design of 2 (subject type: low penalty group, high penalty group) × 2 (penalty time: first win, second win) was used. The subject type was the inter-subject variable, and the penalty time was the intra-subject variable. The dependent variable was the intensity level of the penalty for the other party after the subject was punished.

Experimental materials and equipment

The punitive sound stimulation was white noise for 2.5 seconds. Based on Zhang Xuemin et al. [31], four intensity levels of 80 dB, 90 dB, 100 dB and 110 dB were available for selection, corresponding to computer keyboard numbers of 1, 2, 3, and 4, and the sound intensity was calibrated with the audio format software star WMAWAV. The game was programmed using the software E-prime.

Experimental procedures

The paradigm of competitive response time was used. The game

Type of subject	Period	N	M	SD
Non-game players	Baseline	15	79.94	8.51
	In-game	15	80.08	9.72
Game players	Baseline	15	77.97	6.05
	In-game	15	81.23	8.08

Table 3: Descriptive statistics of the baseline and in-game heart rates of the two types of subjects.

players were randomly divided into two groups, with one group receiving the high-intensity punishment (110 dB) and the other group receiving the low-intensity punishment (80 dB). As the task assignment, the subject was asked to play a game on the computer and was told that he was competing against another pseudo-subject (whom the subject did not know) in terms of key reaction, and the slower one would be subjected to the sound stimulus penalty by the opponent. The designer of the experiment preset the winning order. Before the experiment started, the subjects were allowed to familiarize themselves with the decibel level of each sound stimulation and were informed that they would be competing against another subject; the loser had to unconditionally submit to the sound punishment stimulus administered by the winner, who could choose the level of the penalty noise among 4 decibel strengths. In fact, the subject was not competing against another subject, and the win or loss status was determined in advance by the experimental programming software E-prime, whose specific design was that the subject would win the first game and select the intensity of punishment for the opponent, then would fail all the tests in the middle and be punished (the subjects in the high penalty group were punished by 110 dB, and the subjects in the low penalty group were punished by 80 dB), followed by a win in the last test. The program automatically recorded the selected level of punishment when the subject won, and the different punishment levels represent different levels of aggression. The higher the level was, the stronger the aggression of the subject after being punished.

Analysis of the results

The variance analysis of the repeated measurement of 2 (group) × 2 (penalty time) showed that the main effect of the subject group was significant, $F(1,58)=10.84$, $p=0.002$, $\eta_p^2=0.16$, that is, the penalty intensity of the subjects who received the high level of punishment (2.567 ± 0.115) was significantly higher than that of the subjects who received the low level of punishment (2.033 ± 0.115). The main effect of penalty time was significant, $F(1,58)=26.57$, $p=0.000$, $\eta_p^2=0.31$, that is, the intensity of the first penalty (1.90±0.89) was significantly lower than that of the second penalty (3.23 ± 0.72). The effect of the interaction between penalty time and group was significant, $F(1,58)=32.46$, $p=0.000$, $\eta_p^2=0.35$. The further simple effect analysis found that, for the high penalty group, the selected penalty intensity for the first win was significantly lower than that for the second win, $p=0.000$, indicating that the high intensity penalty affected the aggression of the subjects. For the low penalty group, the selected penalty intensities for the first win and the second win were not significantly different, $p=0.703$, indicating that the low penalty intensity had no significant impact on the aggression of the subjects (Table 4).

The analysis of the experimental data showed that there was no significant difference in the intensity of punishment between the two groups in the first selection of punishment for the opponent, indicating that the initial states of the subjects in different groups were the same. After being punished, the intensities of the penalties chosen by the two groups were significantly different. Compared with the subjects who received the low-decibel sound penalty, the level of aggression of the subjects who received the high-decibel sound penalty was significantly higher, which was more obvious than previously. This indicated that the penalty factor had an impact on the aggressive behavior of the long-term players. The high intensity of the game punishment increased the aggressive behavior of the long-term players.

Type of subject	Penalty time	N	M	SD
Low penalty group	First win	15	2.07	0.79
	Second win	15	2.00	0.74
High penalty group	First win	15	1.90	0.89
	Second win	15	3.23	0.72

Table 4: Descriptive statistics of the penalty intensities.

Discussion

The habitual physiological input created the reward value of the game stimulus

Online gaming addiction has been increasingly recognized as a mental disorder. Psychological factors (attention, mood, anxiety and impulsivity) were the strongest risk factors for online gaming addiction in the patients with pure online gaming addiction [32]. The results of this study show that the long-term game players exhibited attentional bias toward the game images, and the bias mechanism was attention orientation. Based on the experimental logic of the dot-probe task, the results of this study show that the game images had a reward value to the long-term players but not to the beginner game players. The game stimulus did not have a target oriented reward value, and there was a difference in the in-game heart rate change between the long-term game players and the beginner game players, that is, the long-term gamers showed a higher physiological input to the game, indicating that the habitual high physiological input could further increase the reward value of the stimulus.

The existing research data has also shown that, when an individual is behaving in a goal-directed manner, the vigor with which a particular action is performed is strongly influenced by the overall value of that action. However, in contrast to goal-directed actions, when habits control behavior, it is possible for an individual to vigorously perform an action even when the outcome of the action is no longer valued. As a consequence, the invocation of the habitual control system can lead to apparently paradoxical behavior in which animals appear to compulsively pursue outcomes that are not currently valued O'Doherty and Bae [33,34] also found that both pleasure and arousal could be important motives that make people stick with online game playing they have previously experienced.

The high penalty mechanism of the game design induced the high physiological input of the game players

The high penalty factor in a game design will stimulate game players to maintain a high physiological input. The results of this study showed that compared with the subjects who received the low penalty, the long-term game players who received the high penalty feedback selected the high penalty for their virtual opponent after winning, that is, the high penalty mechanism may activate the reactive aggression of the subjects [35]. Zackariasson [36] proposed that game development has always been dependent on functional business models with the capacity to secure the delivery of fun games to consumers and profit to the developers. Therefore, a hedonic information system will be the most important, and strategy sets are complete with respect to punishment-dominance relations [37,38]. In this context, the feeling of "I am always trying to figure myself out" will be significant through the high punishment cycle. Wheeler, Morrison, Demarree, and Petty [39] demonstrated that increased self-reflectiveness amplified the prime-to-behavior effect. Furthermore, high punitive-mirror subjects shocked higher than low punitive-mirror subjects, but their respective no mirror controls did not differ from each other [40]. Considering that the idea of "entertainment first" in pursuit of a strong and long-lasting stimulus currently has a wide range of popular markets, a strong and long-lasting entertainment stimulus may cause the psychological environment of "sap one's spirit by seeking pleasures" with a lack of core mental development. There are many differences between the hidden dangers of online games and the cultivation of "learning in games" advocated by Confucianism. In terms of emotional development, Confucianism starts from the study of six arts, to access the doctrines via the arts and a state of prosperity and unity in both moral and artistic dispositions. Leisure and elegance is also an important part of life experience and personality development. Confucian culture emphasizes enhancing morality through the arts, that is, to understand the interest of the doctrines in "art" in the process of "appropriate plaything". By learning through games day and night, one can naturally achieve the "strong ability in handling playing". Among them, "appropriate plaything" focuses on the experience of the objects, emphasizing the individual being involved in and understanding the process of experience. Thus, learning through games can beget not only skill but also improve morality [41]. However, while online games, as a new popular phenomenon, are armed with scientific technology, their cultural connotation has not yet fully developed. With regard to future game design and game content development, we should learn from the cultivation concept of Confucian culture to promote its development, instead of tolerating an increasingly higher risk of addiction.

Conclusion

Video games do affect social outcomes. Data from 98 independent studies with 36,965 participants revealed that for both violent video games and prosocial video games, there was a significant association with social outcomes. Whereas violent video games increase aggression and aggression-related variables and decrease prosocial outcomes, prosocial video games have the opposite effects [42]. This study's important contribution was to remind game players to control game time and game frequency reasonably, while allowing gamers to meet their spiritual needs in moderation. In addition, from the perspective of culture, game players should treat the game with the right attitude of "learning in games", the plaything producing a comfortable feeling, without becoming trapped in it. With regard to game developers, they should reasonably regulate the content and playing methods of games and guide national gaming in healthy directions. In addition, it is necessary for the government to guide the public to approach e-sports games with the right attitude.

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