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SCOPING REVIEW: GAMING DECISION IN PROBLEMATIC GAMERS

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A B S T R A K

Problematic gaming ditandai dengan gangguan kendali atas perilaku bermain *game*. Sejumlah studi menunjukkan inkonsistensi kontribusi aspek pengambilan keputusan untuk bermain game, hasil menunjukkan bahwa problematic gamers memiliki kemampuan pengambilan keputusan yang terganggu. *Scoping review* ini bertujuan untuk menghasilkan tinjauan komprehensif tentang literatur yang relevan untuk memandu penelitian mengenai pengambilan keputusan untuk bermain *game* (*gaming decision*) pada *problematic gamers*. 9 artikel dari 5 sumber menunjukkan bahwa pada berbagai penelitian mengenai *gaming decision* bahwa metode kuantitatif juga kualitatif digunakan sebagai pilihan desain riset, analisa yang dilakukan juga mengaitkan pengambilan keputusan dengan mekanisme proses kognitif pada diri *problematic gamers*, membandingkan proses kognitif antar kelompok dengan karakteristik yang berbeda, menggunakan sejumlah instrumen *decision making task* untuk mengukur perbedaan proses dan kualitas pengambilan keputusan, serta dominasi partisipan dengan kriteria *Internet Gaming Disorders* yang menunjukkan kurangnya kemampuan dalam pengambilan keputusan, dipengaruhi kemampuan kontrol kognitif serta rendahnya kemampuan memanfaatkan umpan balik untuk memperbaiki pengambilan keputusan selanjutnya.

Kata kunci : *Gaming Decision; Problematic Gamers; Internet Gaming Disorders*

A B S T R A C T

Problematic gaming is characterized by impaired control over gaming behavior. A number of studies show inconsistencies in the contribution of decision-making aspects to game play, the results show that problematic gamers have impaired decision-making abilities. This scoping review aims to produce a comprehensive review of relevant literature to guide research regarding gaming decisions among problematic gamers. 9 articles from 5 sources show that in various studies regarding gaming decisions, quantitative and qualitative methods are used as research design choices, the analysis carried out also links decision making with cognitive process mechanisms in problematic gamers, comparing cognitive processes between groups with different characteristics, used a number of decision making task instruments to measure differences in the process and quality of decision making, as well as the dominance of participants with Internet Gaming Disorders criteria which shows a lack of ability in decision making, influenced by cognitive control abilities and a low ability to utilize feedback to improve subsequent decision making.

Keywords : Gaming Decision; Problematic Gamers; Internet Gaming Disorders

A. Introduction

The fundamental difference between the period before and after the emergence of the internet is the availability of easy access to various human needs, including the need for entertainment and games. In Indonesia, online game players reach 100 million people and are ranked 6th in Asia[1], and when compared to the global population, around one-third of individuals play video games[2]. Playing online games allows a group of individuals to engage themselves, channel their hobbies, and gain a pleasurable experience. On the other hand, there is a group of people who constantly play online games, play for very long periods, and experience negative consequences.

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Online gaming raises new concerns since it can keep players captivated by their screens for extended periods. Spending more than 6 hours per day playing online games is likely to lead to psychiatric symptoms[3], and for internet games in particular, gaming for 4 hours per day is considered problematic[4,5]. The time one spends surfing the internet can lead to problematic behaviors[6] namely mental health, specifically psychological distress[7], depression and anxiety[8], sleep disorders[9], obsessive-compulsive symptoms, and hostility/aggression[10].

However, given the prevalence of the internet in everyday life, focusing on time consumption as the primary element in diagnosing hazardous behaviors is no longer accurate. According to Kardefelt-Winther et al.[11], when repetitive conduct causes injury or discomfort, repeated action is defined as problem behavior. Thus, the description of the physical and psychological impacts that occur as a negative result of online gaming activity determines whether the practice is harmful or can still be considered reasonable.

Billieux et al[12], divided problematic gamers into three groups, namely escapers (gamers who play games to reduce negative emotions, have low self-esteem, but have high achievement motives and escape motives, and high impulsivity), achievers (gamers who are motivated to achieve achievements in playing games; less motivated by role-playing, socializing or problem avoidance motives), and hardcore players (gamers who experience the most negative consequences, spend the most time gaming than other types of gamers, have equally high motives for role-playing, performance achievement, role-playing, self-esteem, and problem avoidance; they also identify themselves through their online reputation and a virtual life).

In some literature, problematic gaming behavior is referred to as Internet Gaming Disorder (IGD). In the Diagnostic and Statistical Manual of Mental Disorders (5th ed) (DSM-5), Internet Gaming Disorder (IGD) is defined as the persistent and repeated use of the internet in a game together with other gamers and clinically leads to psychological disturbance or distress[13]. The behavioral characteristics displayed in individuals who experience problematic gaming are, continuously thinking about games (preoccupation), feelings of anger or anxiety when not playing games (withdrawal), increased need (time) to play games (tolerance), inability to resist the urge to play games (loss of control), loss of interest in other activities besides playing games (loss of nongaming interest), continue to play online games despite knowing the dangers/risks that will be faced (gaming despite harms), lying about the use of time spent playing games (deception of others about gaming), playing games as an effort to improve, reduce or avoid negative feelings (gaming for escape or mood relief) and experiencing conflict and interference in aspects of interpersonal relationships, education and work, due to playing online games (conflict/interference due to gaming).

Understanding problematic gaming behavior is based on a conceptual model that emphasizes the role of factors that contribute to the adverse risks of gaming, including psychological traits that underlie vulnerability and develop into problematic gaming behavior. Not all vulnerable gamers will become addicted, nor will all types of games lead to addiction. Adverse gaming risks arise as a result of vulnerable gamers' interactions with addictive game features or properties[14].

The development of research to understand problematic gamers over the past two decades has led to a prototype model perspective that is considered capable of straightening out the way of thinking about problematic gaming behavior[15], one of which is the multidimensional model of The I-PACE. This model is considered the most comprehensive to explain the emergence of problematic online behavior. Brand et al. [16] emphasized the role of various cognitive and affective processes that may directly or interactively influence repeated gaming decisions, despite long-term negative

consequences. Over time, associations between affective and cognitive responses, decisions to behave in a certain way, experiences of gratification and compensation, and specific expectations may become stronger. As a result, control over behavior by general inhibitory control mechanisms becomes more difficult, and the decision to behave in a certain way is guided more predominantly by impulsive/reactive responses to triggers. In conclusion, individuals who have a predisposition to addiction will seek satisfaction from gaming behavior, which leads to significant changes in emotional and cognitive responses to gaming, resulting in habitual gaming behavior, as compensation for, and resulting in negative consequences.

A game, involving massive types of stimulation and information, where the game is designed in detail, thus provoking imagination and demanding strategy in completing a game. Loftus and Loftus stated that games provide opportunities to correct mistakes and minimize the sense of failure when making mistakes; where in real life, one's failure to act can have a permanent and unrepeatable impact. This condition becomes a reward for individuals who play games, so psychologically they are comfortable and want to repeat the activity even though they know the negative consequences that will be faced[17]. This is thought to be related to the risk evaluation process and reward processing in impaired decision-making[16].

Decision-making processes have been highlighted in addiction research. Decision-making processes are considered relevant in a variety of addictive behaviors[18], including problematic gaming behavior [19]. In line with this, Brand et al.[20], Dong & Potenza[21], and Wei, Zhang, Turel, Bechara, & He[22], in their research on the chain of affective and cognitive events that contribute to understanding which processes are involved in the decision to game; and found that the decision making variable (gaming decision) describes the development and persistence of gaming disorder.

Until the last two decades, research on how the decision-making aspect of gaming decision contributes has been inconsistent. It has been found that problematic gamers decision-making skills are impaired[16,19], but other studies have found that problematic gamers have relatively "normal" decision-making skills, even better than non-problematic gamers[23,24], This is the purpose and basis for the author's consideration of the urgency to conduct a study on decision-making in problematic gamers through the scoping review method.

B. Methods

To produce a comprehensive review of the relevant literature to guide research on decision-making in problematic gamers, a scoping review method was used. A scoping review is a form of knowledge synthesis that addresses exploratory research questions aimed at mapping key concepts, types of evidence, and gaps in research related to a particular area or field by systematically searching, selecting, and synthesizing existing knowledge[25]. This type of description of several articles makes scoping reviews suitable for identifying emerging trends in the literature relating to decision-making in problematic gamers in terms of nature, description, and content and allows for the demonstration of research conclusions and identification of relevant research gaps[26]. The methodology proposed by Arksey and O'Malley[27], inspired the extraction process used in scoping the results in this paper.

The article search was conducted between August and December 2022. Subsequently, a more comprehensive search was conducted to find articles that had emerged after the initial study. Researchers conducted searches with the specified keywords in five databases, namely ScienceDirect, Taylor & Francis Online, ProQuest, SAGE Publications, Emerald Insight, and gray literature (Google Scholar). The search strategy through the keywords "decision making", "decision to game",

"problematic gamers" or "internet gaming disorders" was combined with the Boolean operator AND. The inclusion criteria for related studies were (1) focus on decision-making in problematic online gamers (2) English language and (3) publication between the years 2000-2022 to capture the most recent research results since the development of research on online gaming behavior in the early 2000s. All research designs, both quantitative and qualitative, were selected. After duplication, abstracts and full-texts were sorted to ensure compliance with the above requirements. Relevant data was extracted and the researcher analyzed and summarized findings from each article. Details of the relevant document identification and selection activities are illustrated in Figure 1.

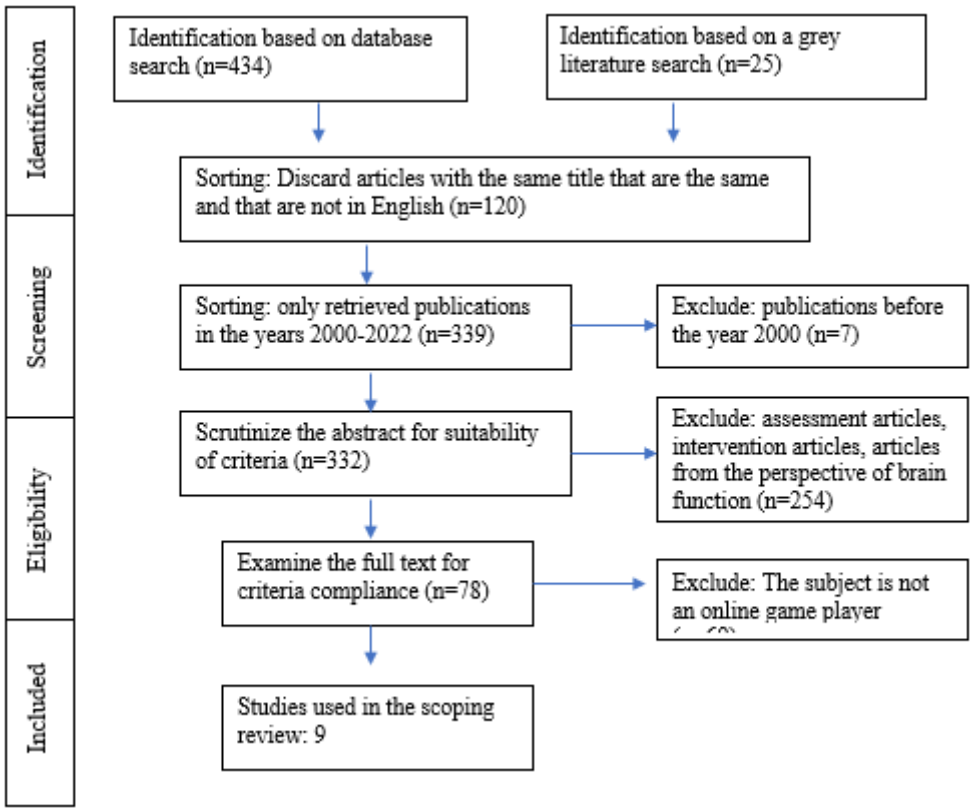

Figure 1. Flow Chart of The Search Procedure

C. Result and Discussion

Result

Based on the author's search results, 459 article documents were acquired that were potentially relevant to the topic of gaming decision-making in problematic gamers. A total of 189 documents were excluded because they did not meet the specified criteria, which included books or theses/dissertations in languages other than English, as well as research articles on psychometric analysis of measurement instruments, implementation of psychological interventions, and measurement of brain functioning. Table 1 describes the characteristics and key findings of each article.

Table 1. Characteristics and Key Findings

No	Author	Study objectives	Sample Characteristics	Methodology	Results
1	Yao, Zhang, Fang, Liu & Potenza, 2021	(1) Estimation of the aggregate effect size of decision-making in Internet Gaming Disorders (IGD) (2) Tested the moderating effects of situation and decision valence **Hypothesis:** (1) Individuals with IGD exhibit reward-related decision-making dysfunction and are related to the type of decision-making situation. (2) Decision-making changes in individuals with IGD are associated with IGD severity and impulsivity.	**Sample**: From 24 studies, 604 participants with IGD, 641 control participants, 35 ES	**Instruments:** PRISMA (Preferred items for Systematic Review and Meta-Analysis) **Data Analysis:** (1) STORBE Guideline for study quality assessment, (2) WEbPlotDigitizer for data extraction, (3) ES heterogeneity analysis used Q and I2 tests (4) The leave-one-out method to verify the reliability of the results. (5) The funnel plot &and Egger's test to measure the risk of publication bias (6) Trims-and-fill method to calculate Effect Size after calculation of publication bias	1) Individuals with IGD showed poor performance in the fulfillment of reward-related decision-making tasks. (2) No significant associations between IGD severity and decision-making differences (3) No significant association between IGD severity and impulsivity 4) IGD is associated with mild dysfunction and indecision-making. *(5)* Individuals with IGD display different behaviors when deciding whether to avoid losses or seek gains.
2	Zhou, Yao, Fang & Gao, 2021	Explored the dynamics of neural activity over simultaneous impulsivity and control systems in individuals with Internet Gaming Disorder (IGD) from a dual-process perspective,	**Samples:** 50 male students (24 IGD, 26 RGU) Average age: (IGD = 20.21, RGU = 19.23) Selection of IGD: Based on IAT score (>50) and diagnosis of IGD from DSM (=5), 50% of online time in a day is used for	**Instruments:** To measure decision-making under risk, participants were given The Cup Task (TCT) and Game of Dice Task (GDT). To measure the delay discounting process, participants were administered the Delay Discounting Task.	(1) Individuals with IGD did not show impaired impulse control. 2) The IGD and RGU subject groups did not show the common risky choice framing effect, and their risky choices were

		using a decision-making task. **Hypothesis** : There is hyper-activity in the impulsivity system and, concomitantly, simultaneous control system hypo-activity during the decision-making process, in individuals with IGD compared to Recreational Gaming User (RGU) subjects.	playing online games. RGU selection: based on IAT score (<50), DSM diagnosis of IGD (<5)	**Data Analysis:** Analysis of behavior through the TCT instrument using ANOVA. A T-test was used to identify differences between groups.	not influenced by framing. 3) Participants exhibited more rational behavior, i.e., minimal emotional involvement during risky decisions. 4) RGU subjects made decisions after deliberate consideration, whether their choices were non-impulsive or impulsive.
3	Wolfing, Duven, Wejbera , Beutel & Muller, 2020.	To compare the impulsivity facet of unfavorable decision making, between subjects with Internet Gaming Disorders (IGD) and Gambling Disorder (GD). **Hypothesis:** (1) Subjects with GD who are the fastest will take the monetary reward (2) Subjects with IGD will show steeper results than the control group (healthy) (3) Subjects with IGD will show less ability to resist temptation and trade-off immediate rewards	**Samples:** 31 GD patients, 31 emergency room patients, 27 control group (healthy category) with male gender	**Instruments:** Lie/Bet Questionnaire to measure GD, AICA-Sgaming to measure IGD, BIS-11 to measure impulsivity, clinical interview guidelines, as well as task instruments to measure decision-making components: Delay Discounting Task and IOWA Gambling task. **Data Analysis:** ANCOVA was used to analyze the area under the curve (AUC). As a post-hoc test, the Games-Howell test was used. Pearson's test was used to analyze correlation values between questionnaire results.	(1) IGD subjects were not different from other groups; they tended to be spontaneous in processing information. 1) The monetary reward effect occurred in the GD group. 2) IGD subjects showed better and faster ability to adapt to strategies. 3) Aspects of impulsivity were associated with deficiencies in decision-making ability and delayed gratification in IGD and GD subjects.

4	Brandtner, Wegmann & Brand, 2020	**General purposes:** (1) Explored the function of desire thinking that accelerates cognitive processes, mediating the relationship between the initial urge to play games and the decisions made by recreational gamers. (2) Identified the contribution of affective and cognitive functions in decision-making to play games	**Samples:** (1) Study 1: 6 gamers with a minimum gaming duration of 14 hours/week (Average age: 28.1 years; Mean playing time: 29.1 hours/week) (2) Study 2: 118 gamers (Mean age: 34.1; Mean playing time: 21.4/week)	**Instruments/Methods:** (1) Study 1: A qualitative approach to the exploration of conflict situations in the daily lives of gamers, where they will decide whether to game or not to game: FGD & online survey (2) Study 2: Visual Analogue Scale (VAS) to measure the urge to play games, Desire Thinking Questionnaire (DTQ) to measure desire thinking, Conflicting Situations Catalog for Gaming (CSC-G) to measure decision making in conflict situations, Internet Gaming Disorders Test (IGD-T) to measure IGD severity. **Data Analysis:** Sequential mediation analysis using MPlus8; correlation analysis using two-twirled Pearson correlation and independent variable collinearity test using The Tolerance Index (Ti) and the Variance Inflation factor (VIF).	(1) Desire thinking plays a role in the tendency of problematic gaming behavior. (2) Desire thinking acts as a mediator between initial desire and gamers' decision to game (3) In the early process of developing addictive behavior, a good reason to play games leads to a conscious decision to play games.
5	Ko, Wang, Liu, Chen, Yen & Yen, 2017	Evaluated adaptive decision-making, risky decision-making, and decision-making styles in individuals with Internet Gaming Disorders (IGD). **Hypothesis:** Individuals with IGD choose	**Samples:** Total: 147 people were divided into 87 people with emergency room and 87 people without emergency room. Inclusion criteria: playing online games >40 hours/week, playing games for >2 years, and clinical interview	**Instruments:** Preference for the Intuition Deliberation Scale (PID) measures an individual's tendency to make decisions based on intuition or deliberation, In decision-making, The Barratt Impulsiveness Scale (BIS-11) measures impulsivity, Adaptive Decision-Making Tasks to measure decision-making, and semi-structured interview	(1) Individuals with IGD showed sensitivity to Estimated Value (EV) in decision-making and selection of risky choices. (2) Individuals with IGD preferred risky choices in the gain domain

		higher risk in a given decision-making task.	based on Mini International Neuropsychiatric Interview (MINI).	based on DSM to measure IGD. **Data Analysis:** T-test, ANOVA, and Pearson Correlation Coefficient	(3) Individuals with IGD rely more on intuition than judgment, in making decisions
6	Yao, Wang, Yip, Chen, Li, Xu, Zhang, Deng, Liu & Fang, 2015	Comprehensively measured the relationship between inhibitory control and the decision-making process. **Hypothesis:** (1) Subjects with IGD will display impaired inhibitory control, using the Go-NO-Go Task and the Stroop color-word task. (2) Subjects with IGD will display impairments in decision-making, based on measurements with the IGT and the Cup Task. (3) There is a positive association between decision-making and inhibitory control in IGD subjects.	**Samples:** 34 people with ED, 32 people without ED (all male and university students) Inclusion criteria: CIAS score > 67, time use 14 hours/week, and reported gaming as a major online activity.	**Instruments:** Go/No-Go Task to measure inhibitory control, The Stroop color-word interference task to measure cognitive control, The IGT and The Cup Task to measure decision-making.	(1) Subjects with IGD showed impaired inhibitory control when facing game stimuli and risky decision-making. (2) The cognitive control mechanisms of subjects with IGD were impaired with the display of specific addiction cues. (3) IGD subjects were impaired in decision-making with risk but displayed reasonable performance in decision-making with ambiguity. (4) IGD subjects tended to perform poorly in risk decision-making
7	Yao, Chen, Chen, Wang, Zhang, Xue, Deng, Liu, Yip	Investigated the effects of feedback processing in the decision-making of subjects with Excessive	**Samples:** 52 male university students. The EIG group was 26 people (mean age: 22.54, mean gaming time: 17.02). people (mean age: 22,	**Instruments:** CIAS was to measure online addiction, Original & and modified GDT was to measure decision-making under explicitly risky conditions	(1) Subjects with EIG with strong IGD symptomatology showed impaired decision-making ability on the Game

	& Fang, 2014	Internet Gamers (EIG) **Hypothesis:** (1) Subjects with EIG will perform poorly on the Game Dice Task (GDT) compared to Occasional Internet Gamers (OIG). (2) Subjects with EIG fail to utilize the feedback from the previous phase to improve their decision-making.	mean gaming time: 0.87) EIG inclusion criteria: CIAS score > 67, plays online games at least 14 hours/week, use 50% of his/her online time to play games.		Dice Task (GDT). (2) Subjects with EIG failed to utilize feedback from the previous phase to improve their decision-making
8	Pawlikowski & Brand, 2011	Measured decision-making competence in World of Warcraft gamers. **Hypothesis:** The Excessive Internet Gamers (EIG) group showed impaired decision-making compared to the control group (non-gamers).	**Samples:** EIG group 19 people (mean age 23.4, mean time use 24.2) and non-gamers group 19 people (mean age 24.3).	**Instruments :** GDT was to measure decision-making under risky conditions, IAT was to measure internet addiction, SCL-90-R was to measure psycho-psychiatric symptomatology and WoW-specific information, and the GITB reasoning sub-test was to measure logical thinking ability.	The EIG group showed adverse decision-making compared to the non-gamers group
9	Ko, Hsiao, Liu, Yen, Yang & Yen, 2010	Evaluated decision-making characteristics, risk-taking potential, and personality traits. **Hypothesis:** The IGD group will show poor performance on the IGT, as well	**Samples:** 139 high level addiction group (mean time use >20 hours/week) and 77 low level addiction group (mean time use <2 hours. week). Consisting of 132 males and 84	**Instruments:** DCIA-C was to measure internet addiction, TPQ to measure personality, and The IGT and BART were to measure decision-making **Data Analysis:** Chi-square analysis, T-test, and MANOVA	(1) The group of students who experience internet addiction showed low reward dependence and high novelty seeking which predisposes someone to maintain their

as a greater tendency to take risks	females (mean age 21.45).	addictive behavior. (2) The group of students with IGD did not show a high tendency to take risks.

Discussion

This review included nine research that used quantitative (self-report, cognitive task) and qualitative (clinical interview) approaches. The articles were from reputed international (English language) journals (Q1) published between 2010 and 2021. Four studies were undertaken in Germany, three in China, and two in Taiwan (2).

Participants in all studies were online game players commonly referred to as gamers, online gamers, or players with varying age criteria (18-56 years). Sample sizes ranged from 38 to 1245 people and were predominantly male. A literature review on this characteristic also stated that the prevalence of IGD is higher in male gamers than in women [28,29,30], and the prevalence of men is higher to become addicted to online games[31,32]. Most of the participants were students at a university, and several studies in previous research suggest that university students show increased vulnerability to IGD[29,32]. The game genres played were Massively Multiplayer Online Role-Playing Games (MMORPG), Multiplayer Online Battle Arenas (MOBA) and Massively Multiplayer Online First Person Shooters (MMOFPS) using a personal computer (PC), laptop, and cell phone media.

Inclusion and exclusion criteria were used throughout the study to categorize samples that experienced addiction or non-addiction in several ways, namely (1) self-report to measure internet addiction, such as IAT (Internet Addiction Test) as well as its modifications, based on the original version by Young[34]; CIAS (Chen Internet Addiction Test) by Chen et al[35] (2) based on IGD criteria from DSM-V (3) based on the duration of time playing online games (time use): ranging from 14 to 20 hours per week to classify problematic gamers and less than 2 hours/week or not at all to classify non-problematic or healthy gamers (4) the percentage of time use when online, some or most (>50%) was used for access to games (5) interviews based on the characteristics of problematic gaming behavior, such as IGD characteristics from DSM-V, MINI (Mini International Psychiatric Interview) especially in research involving subjects who show psychiatric symptoms.

To measure gaming decision-making ability or style, almost all studies used decision-making tasks such as The Game Dice Task (GDT), The IOWA Gambling Task (IGT), The Balloon Analogue Risk Task (BART), The Delay Discounting Task (DDT) and the cups task.

Most studies reported that the average length of online gaming time for problematic group participants was 14-24 hours/week (n=7), with one study using a criterion of more than 40 hours/week. Meanwhile, studies that used a comparison group (non-problematic; healthy gamers), mentioned a duration of less than 2 hours/week (n=7) and less than 4 hours/week (n=1). One study did not specify the length of time played or the range of time spent. Four studies mentioned how long participants had been playing online games (6-9 years), 2 studies without specific information (only mentioning routine or active gaming) and 3 studies did not mention information.

All studies related gaming decision-making to cognitive processing mechanisms in problematic gamers. Comparing cognitive processes in two groups with distinct characteristics is very prevalent in behavioral addiction research. In this review, one study compared the decision-making process of

problematic gamers with a type of behavioral addiction that is included in the official DSM diagnosis of Gambling Disorders (GD), and another study compared with a group of non-problematic/healthy gamers. In terms of other psychological variables, studies on the role of gaming urge and desire thinking (n=1) and personality (n=1) on gaming decision-making were conducted on both criteria groups of gamers. Specifically, the differences in decision-making styles (n=1) as well as the decision-making process (n=1) to play online games and how the role of impulse and control (n=1) was also a concern of the researchers' research urgency regarding this gaming behavior disorder. The utilization of feedback and reward-related in risky decision-making was also discussed in detail with the collaboration of neural function assessment (n=3).

Maladaptive decision-making is one of the key symptoms of addictive behavior[36,37,38]. Findings in previous research suggested that individuals with addiction and substance abuse have impaired performance on a variety of decision-making tasks[16,36]. Recent studies have shown deficit decision-making in individuals who experience problematic gaming behavior. Researchers found that individuals who experience problematic gaming, or IGD, make relatively more unfavorable choices on the Game of Dice Task than healthy gamers[39], and that the impairment may be part of a failure to utilize feedback[40]. Evidence also suggested that individuals with internet addiction were impaired in decision-making under ambiguity based on the Iowa Gambling Task [41,42].

Individuals with problematic gaming behavior have been shown to have a range of decision-making biases that fundamentally interfere with their ability to make reasonable judgments about gaming activities. Individuals with IGD tended to justify their decision to continue engaging in internet gaming despite knowing the detrimental consequences[15].

Studies have identified that problematic gamers tended to have different abilities in control of neurocognitive tasks such as attention, processing, and decision-making. Problematic gamers have biases in how they interpret and process game-related information[43]; they make poorer decisions under risky conditions[40]; and they are less able to delay gratification for greater rewards[39].

Based on the I-PACE multidimensional framework, this decision-making model describes individual factors (e.g., personality traits such as impulsivity) and situational factors (e.g., rewards offered by the decision situation, distress) that can influence the decision-making process. The interaction between individual factors and situational factors determines which system is dominant in the decision to play a game. For example, if an individual is highly impulsive (individual factors that influence impulsive processing) and/or under acute stress (situational factors that weaken reflective control), he or she is likely to be guided by the impulsive system. Theoretically, behaviors such as addictive or problematic, are assumed to result from an imbalance between two neural systems: the emotion-based impulsive system and the cognitive control-based reflective system, which interact during decision-making[36]. In conclusion, individuals who have a predisposition to addiction, will seek satisfaction from gaming behavior, which leads to significant changes in emotional and cognitive responses to gaming, resulting in habitual gaming behavior, as compensation for a change (e.g. craving, urges), and resulting in negative consequences.

Affective and cognitive Response as the Affective (A) component of the I-PACE multidimensional model, defined as affective and cognitive responses to internal and external stimuli, refers to changes in mood and thinking that follow exposure to the gaming stimulus, including coping tendencies, cognitive bias, craving, and urges. In the coping component, research has shown that rather than engaging in problem-focused coping strategies to address gaming problems, such as

seeking help or playing less, they choose to increase their gaming behavior and deny any resulting problems[44].

The cognitive bias component refers to the behavioral tendency to more quickly, efficiently, or accurately remember, recognize, and/or respond to stimuli associated with rewarding substances or behaviors[43].According to research conducted by Zhou[45], individuals with addiction to online games, have a cognitive bias towards information related to internet games. Cognitive biases as well as poor executive function skills (lower mental flexibility and response inhibition), have a role in internet addiction disorder. In the craving & and urge component, research conducted by Dong[19] stated that in problematic gamers, playing games increases craving in response to game-related stimuli. Whereas in the non-problematic gamers group, this was not proven. In addition, the inhibitory control component involves the ability to control one's attention, behavior, thoughts, and/or emotions to overcome internal tendencies or strong external appeals, and instead do what is more appropriate or necessary. Without Inhibitory control, individuals would be under the control of impulses, old habits of thinking or acting (conditioned responses), and/or stimuli in the environment that pull us to different sides.

Decision-making is the end of the cognitive process of the individual that he or she will choose to do or not do online gaming. Individuals with problematic gaming behavior have been shown to have a range of decision-making biases that fundamentally interfere with their ability to make reasonable judgments about gaming activities. They tend to justify their decision to continue engaging in internet gaming despite knowing the adverse consequences[15]. Individuals who experience problematic gambling were reported to experience a deficit in decision-making based on the results of the Iowa Gambling Task[46]. This deficit, which indicated a decision-making process based solely on immediate highs and wins without regard to potential losses, may explain why individuals with problematic gaming behavior choose to continue gaming; similarly to individuals with problematic gambling behavior; even though they are aware of the negative outcomes caused by this behavior. The author assumed that non-problematic gamers have better decision-making skills than problematic gamers.

D. Conclusion

This scoping review is significant for synthesizing findings from studies examining gaming decision-making in problematic gamer populations, as well as underlining the significance of this topic in online gaming research. Problematic players frequently have difficulties making decisions about playing online games. All studies in this review highlighted the importance of further studies on decision-making processes and online gaming. The recommendations of this scoping review are to re-understand the decision-making process and other variables that influence problematic gamers; to specify and diversify the sample, methods, and variables of interest; and to find ways in which researchers in this field can develop interventions to achieve healthy and non-problematic online gaming behavior.

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