



Research Article

DOI: 10.58966/JCM20254spl09

Dopamine Loops and Player Retention: A Study on Reinforcement in Free-to-Play Games

Sarvajith Kumar J N^{1*}, Manohar N²

¹Assistant Professor, Department of Management, Cresta First Grade College, Mysuru, Karnataka – 570028.

²Assistant Professor, Department of Journalism, Government First Grade College for Women, M G Road, Hassan, Karnataka – 573202.

ARTICLE INFO

Article history:

Received: 18 June, 2025

Revised: 04 July, 2025

Accepted: 22 July, 2025

Published: 18 August, 2025

Keywords:

Dopamine Loops, Free-to-Play (F2P), Monetization, Player Retention, Reinforcement Mechanisms, Exploitative Gamification.

ABSTRACT

Free-to-play (F2P) games are ruling the gaming world and use dopamine-driven reinforcement mechanisms to increase player retention and monetization. This paper aims to explore how random reward systems, time-locked progression, artificial product scarcity, social reinforcement, and frustration as forms of monetization affect player engagement. This research is based on the qualitative content analysis of popular F2P games, including Genshin Impact, Fortnite, Clash of Clans, and Candy Crush Saga. The study establishes that the game design elements trigger dopamine release and thus encourage habitual play and spending money in micro-transactions. The results show that even though these mechanisms are quite effective in increasing engagement, they pose several ethical questions concerning gamification and exploitative monetization. This paper further suggests that game designers should develop morally right monetization models that would help in achieving the right balance between the profitability of the industry and the well-being of the players. The immediate future work should be directed at understanding the long-term consequences of dopamine loops, the impact of regulatory measures on F2P monetization, and the differences in gaming behavior.

INTRODUCTION

Dopamine, being a reward neurotransmitter and enjoyable agent, plays a role in habit formation, motivation, and addiction mechanisms. In free-to-play (F2P) games, the game developers implement reinforcement loops that tactically manage the release of dopamine to keep players engaged (King, Delfabbro, & Gainsbury, 2019). These loops enable habitual gameplay, trigger micro transactional spending, and foster long-term player retention (Király et al., 2017). F2P games employ psychological reinforcement processes to create this phenomenon. Variable reward schedules, for example, offer random rewards, which create fluctuations in dopamine that induce repeated exposure (Davis et al., 2021). Artificial scarcity and temporally limited mechanics like limited events generate a sense of urgency that raises the rate of play sessions (Wood, Griffiths, & Parke, 2007).

Furthermore, social and competitive forces—narrated through features in the form of leader boards, guilds, and co-op play—reaffirm players' loyalty to the gaming community (Elson & Ferguson, 2014). This study explores how such dopamine-focused mechanisms reinforce player investment, inform behavioral patterns, and impact the gaming experience in F2P environments.

Research Problem and Significance

Free-to-play games rule the gaming universe, generating billions of dollars in revenue while giving players what appears to be free access. But behind the scenes, these games utilize behavior reinforcement mechanisms that encourage compulsive play and spending behavior (King & Delfabbro, 2020). This habit-forming design dependence is a psychological problem, with the possibility of gaming disorder, overuse, and financial exploitation (Billieux et al., 2019). Ethically, the use of reward loops

*Corresponding Author: Sarvajith Kumar J N

Address: Assistant Professor, Department of Management, Cresta First Grade College, Mysuru, Karnataka – 570028.

Email ✉: sarvajithjn@gmail.com

Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

© 2025, Sarvajith Kumar J N, This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

on dopamine takes into consideration the obligations of game developers and player welfare effects (Ryan, Rigby, & Przybylski, 2006). Professionally, knowledge of these schemes of retention can guide developers toward ethical and sustainable monetization strategies (Granic, Lobel, & Engels, 2014). Through the examination of how loops of dopamine fuel activity in F2P games, this research adds to the broader discussion of responsible game design and player psychology.

Objectives of the Study

This study seeks to analyze the role of dopamine loops on F2P game retention of players, revisit the reinforcing mechanisms internalized within their mechanisms—i.e., varied rewards, transient events, and micro transactions—and accept ethical concerns to compulsive playing behavior on designs in dopamine. It also seeks to provide a qualitative analysis of players' attraction tactics within the top-played F2P games.

Research Questions

The following key questions guide the study:

1. What reinforcement mechanisms do F2P games use to sustain player engagement?
2. How do dopamine-driven mechanics influence player behavior and spending habits?
3. What ethical concerns arise from employing reinforcement loops in F2P models?
4. Are dopamine loops an essential component of modern player retention strategies?

LITERATURE REVIEW

Theoretical Perspectives on Reward and Habit Formation in Gaming

Two of the foundational theories account for reward and habit formation during gameplay. B.F. Skinner's Operant Conditioning Theory states that behavior that is rewarded will be likely to recur once more (Skinner, 1938). For F2P games, this is utilized in the form of variable ratio schedules of reinforcement whereby random rewards stimulate engagement and enliven repeated behavior (King, Delfabbro, & Gainsbury, 2019). Complementing this, Csikszentmihalyi's Flow Theory describes a state of deep engagement where players become so immersed that they lose awareness of time and surroundings (Csikszentmihalyi, 1990). Dopamine loops enhance this cognitive absorption by providing continuous micro-rewards, sustaining prolonged play sessions (Ryan, Rigby, & Przybylski, 2006). Together, these theories explain how psychological reward structures in F2P games maintain player engagement.

Dopamine and Its Role in Player Retention

Dopamine, a neurochemical linked with motivation, learning, and reward expectation (Berridge & Robinson,

2016), plays a crucial role in F2P retention models. Variable rewards trigger dopamine spikes that strengthen habitual play (Király et al., 2017), whereas microtransaction rewards utilize this reward process to facilitate repeated expenditure and prolonged play (King & Delfabbro, 2020). One of the most glaring examples is the "near-miss effect" of loot boxes and gacha systems, in which players almost get their desired rewards, a dopamine-fueled compulsive buy-like gambling phenomenon (Drummond & Sauer, 2018; Griffiths, 2019). These results support dopamine's vital function in F2P player retention.

Global Studies on Reinforcement and Player Retention in F2P Games

Evidence globally clarifies the role played by reinforcement processes in player engagement. Gaming disorder and its linkage with reinforcement design (Király et al., 2017) and the degree of F2P monetization targeting habit-forming processes (King & Delfabbro, 2020) have been researched. Cross-comparisons have been investigated between loot box processes and reinforcement loops in gambling (Drummond & Sauer, 2018). Research has ventured into time dissociation and mental entrapment in gaming absorption (Wood et al., 2007). Together, these studies describe how reinforcement mechanisms drive participation, spending behavior, and long-term involvement in F2P models.

Ethical and Behavioral Implications of Reinforcement in Free-to-Play Games

The application of habit-forming design in F2P games is of significant ethical significance. Games often include "dark patterns" in their UI/UX that push players, more subtly, towards micro transactions and extended playing time (King et al., 2019). The exploitation of psychological weak points, especially among young players, has evoked broad outrage (Billieux et al., 2019). Monetization schemes such as loot boxes and gacha systems, similar to gambling reward systems, have prompted regulation—Belgium and the Netherlands have prohibited loot boxes because of youth exposure to gambling concerns (King & Delfabbro, 2020; Drummond & Sauer, 2018). In addition, long-term dopaminergic stimulation may lead to cognitive exhaustion and decreased real-life interaction, at times to "gaming narcosis," such that players get stuck in reinforcement loops (Ryan et al., 2006; Granic et al., 2014). These factors continue to exacerbate arguments in balancing enjoyment and player welfare.

METHODOLOGY

Research Design

This research employs a qualitative approach, best suited to analyze game mechanics, reward structures, and psychological loops of engagement (King & Delfabbro, 2020). It employs three primary methods: a content

analysis of F2P games to identify reward structures and monetization strategies, a thematic analysis to establish patterns of dopamine-based retention, and a review of academic literature and industry reports to combine findings from neuroscientific and behavioral studies with ethical monetization viewpoints. This mix provides a systematic analysis of how F2P games maintain motivation through reinforcement cycles.

Criteria for Choosing Games

To guarantee diversity and relevance, games were chosen with certain criteria. The chosen games are mainstream, high-engagement games with massive player bases, high revenues, and huge industry influences. They employ varied monetization schemes—like loot boxes, gacha systems, time-gated rewards, and battle passes—and incorporate psychological reinforcement strategies like dopamine-based rewards, progression rewards, and social mechanisms. The list also cuts across multiple genres (Battle Royale, RPG, Strategy, Puzzle, and Gacha-based games) on mobile, console, and PC platforms.

Selected Games for Analysis

According to these standards, the study examines Genshin Impact, a gacha RPG with randomly rewarded characters and time-restricted event banners; Fortnite, a Battle Royale game with a battle pass model, seasonal rewards, and a time-restricted item store; Clash of Clans, a strategy game with time-restricted building mechanics and pay-to-accelerate upgrades; and Candy Crush Saga, a puzzle game with energy mechanics and progression-based rewards. These games are case studies for the evaluation of dopamine-based engagement tactics (Table 1).

Data Collection

The data are based on secondary sources. Scholarly literature provides information regarding dopamine activity, gaming immersion, and reinforcement loops of behavior (King et al., 2019; Granic et al., 2014). Industry reports and developer insights provide insight into how F2P developers use reinforcement-based monetization and ethical design (King & Delfabbro, 2020). Consumer perceptions and resistance against exploitative approaches are drawn from media critique and public reaction, obtained from player forums, review comments, and controversy (Drummond & Sauer, 2018). This approach ensures a contextualized comprehensive investigation.

Analytical Framework

Thematic Analysis of Reinforcement Techniques

The research uses thematic analysis to ascertain patterns of repetitive behavioral reinforcement. There is also research on the reward mechanisms relying on dopamine, like loot boxes and gacha pulls, to maintain play with random rewards (Drummond & Sauer, 2018). It also researches time-gated systems and artificial scarcity, like Clash of Clans, build timers used to engage microtransaction purchases, and competitive and social rewards, like Fortnite battle pass rewards for daily play in exchange for special treats. These topics group the methods F2P games employ to optimize involvement through dopamine loops.

Ethical Considerations

With limited direct interactions between players, not many moral issues arise. Research is based on open-source information from public databases, academic papers, and company reports (Billieux et al., 2019). It is an equitable game design analysis that balances benefits and harms without judging the industry and maximizes concerns for player well-being by emphasizing compulsive game harms and developers' ethical responsibilities (King & Delfabbro, 2020). This approach maintains academic integrity while objectively assessing dopamine loops in games.

ANALYSIS AND DISCUSSION

Identifying Key Dopamine-Driven Reinforcement Techniques in F2P Games

The subsequent four essential reinforcement mechanisms are revealed through analysis in F2P game design. Variable reward schedules like gacha and loot boxes induce dopamine peaks from unexpected rewards, enforcing habitual interaction (King & Delfabbro, 2020; Drummond & Sauer, 2018). In Genshin Impact, players use Primogems to get random characters or equipment, time-limited banners, and near-miss factors, bringing about the necessity to continue spending. Time-gated progress and simulated lack, such as Clash of Clans' building cooldowns and log-in bonuses, introduce tension and repeated play by constraining growth unless one waits or purchases (Király et al., 2017; King et al., 2019). Social and competitive reinforcement loops, such as Fortnite's battle pass and rankings use social responsibility and

Table 1: Selected Games for Analysis

Game Title	Genre	Key Dopamine Loop Mechanic
<i>Genshin Impact</i>	Gacha RPG	Gacha mechanics (randomized character rewards), limited-time event banners
<i>Fortnite</i>	Battle Royale	Battle pass system, seasonal rewards, limited-time item shop
<i>Clash of Clans</i>	Strategy	Time-gated building mechanics, pay-to-speed-up upgrades
<i>Candy Crush Saga</i>	Puzzle	Free-to-play energy mechanics, progression-based reward reinforcement

Table 2: Case Study Analysis of Selected Free-to-Play Games

Game Title	Reinforcement Mechanism	Player Retention Strategy
<i>Genshin Impact</i>	Gacha mechanics, randomized character rewards	Unpredictable dopamine loops create compulsive spending behaviors
<i>Fortnite</i>	Seasonal battle pass, leaderboard rankings	Social competition and limited-time rewards sustain engagement
<i>Clash of Clans</i>	Time-gated building mechanics, social reinforcement	Players return daily to optimize progress and social connections
<i>Candy Crush Saga</i>	Pay-to-continue mechanics, frustration-based monetization	Players pay to bypass artificial progression barriers

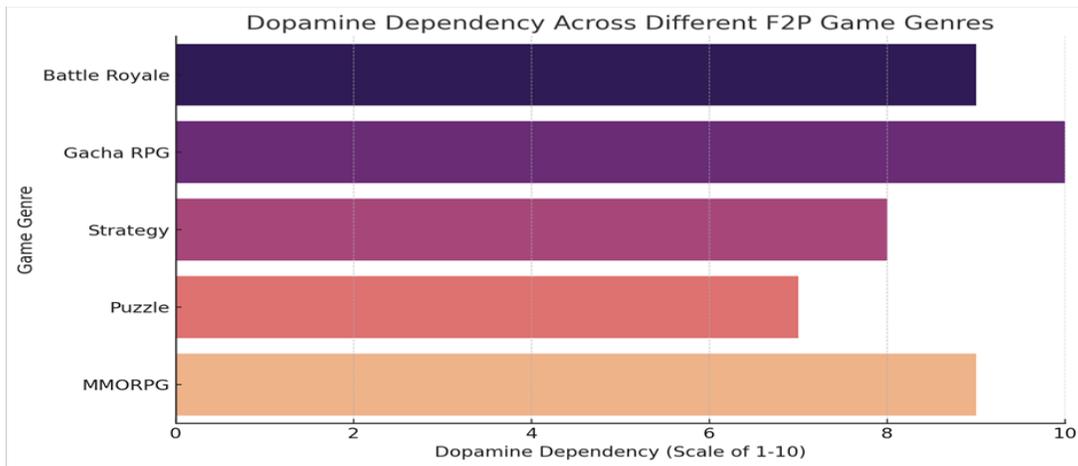


Figure 1: Dopamine Dependency Chart

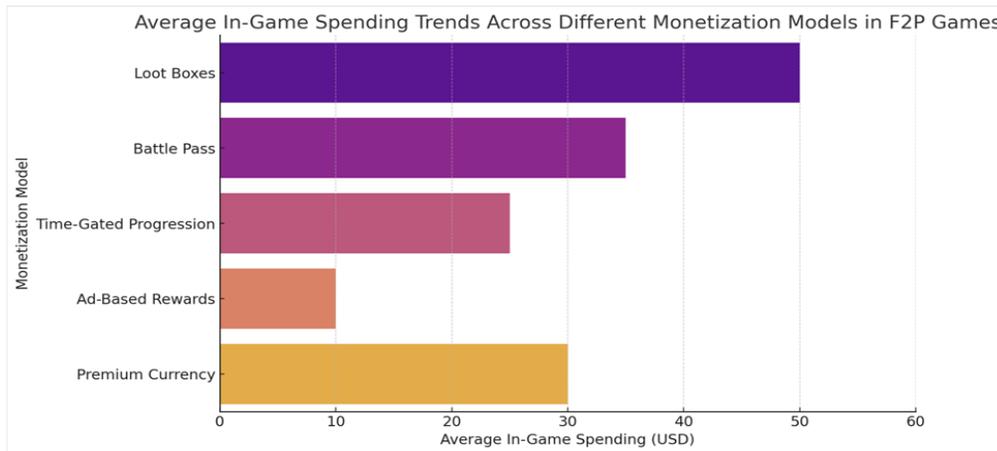


Figure 2: Average In-Game Spending Trends

rank-based rewards to encourage long-term play (Granic et al., 2014; Ryan et al., 2006). Finally, monetized interaction and microtransactions, as exemplified by Candy Crush Saga’s energy mechanism and pay-to-retain features, leverage frustration and the sunk cost fallacy to induce frequent small payments (Billieux et al., 2019; Elson & Ferguson, 2014).

Case Study Analysis of Selected Free-to-Play Games

The games mentioned are instances of these mechanics. Genshin Impact uses gacha mechanics to apply addictive spending with randomized rewards. Fortnite maintains engagement with seasonal battle passes and competitive ranks. Clash of Clans provides repetitive returns with time-gated improvement and social reinforcement. Candy

Crush Saga profiteers with frustration with energy restrictions and pay-to-continue reminders. The above examples provide the manner loops achieved through dopamine to enhance retention and revenues.

The following table 2 summarizes how different F2P games implement dopamine-driven retention mechanics:

This analysis highlights how F2P games manipulate dopamine-driven reinforcement loops to maximize retention and monetization (Figure 1).

Ethical and Behavioral Concerns of Dopamine Loops in Gaming

Habit-forming design dependency has a psychological effect with overstimulation from dopamine that could result in compulsive gaming among young players especially (King et al., 2019; Billieux et al., 2019). The casino-like aspect of gacha systems and loot boxes prompted bans in some nations, such as the Netherlands and Belgium, due to vulnerability among youths (Drummond & Sauer, 2018; King & Delfabbro, 2020). Moreover, the “free” tag of F2P is misleading since monetization relies on several whales who play big and frictional points such as pay walls (King et al., 2019; Elson & Ferguson, 2014). These problems energize arguments about the ethical design and exploitation of players (Figure 2).

Media and Industry Responses to Dopamine-Driven Game Mechanics

Pressure from the public against manipulative design, particularly loot boxes, has become more vocal, with consumer activism organizations calling for gambling-like controls (King et al., 2019; Drummond & Sauer, 2018). As a response, some developers have embraced self-regulation by revealing the odds of loot boxes and implementing parental controls (Billieux et al., 2019), while other publishers like EA and Activision are being sued for exploitative actions. These events indicate a greater level of awareness of the ethical aspect of dopamine loops.

SUMMARY OF KEY FINDINGS & CONCLUSION

Free-to-play (F2P) games employ carefully designed reinforcement mechanisms that stimulate the brain’s dopamine system, encouraging players to continue playing and spending. Techniques such as variable reward schedules, time-gated progression, social reinforcement, and microtransactions are strategically implemented to create habit-forming play loops. These mechanics often mirror those used in gambling environments, reinforcing behavior through unpredictable rewards and short-term gratification, thereby sustaining player engagement over extended periods.

The widespread use of these mechanics raises important ethical concerns for the gaming industry. Features such as compulsive play patterns, gambling-like

structures, and manipulative monetization strategies challenge the well-being of players, especially vulnerable populations. To promote responsible design, developers are encouraged to eliminate artificial scarcity, enhance transparency in loot box odds, and implement spending limits. These measures can help mitigate harm and foster healthier gaming ecosystems.

However, the limitations of this qualitative study must be acknowledged. The analysis is based on a small selection of games and lacks direct player input, as no surveys or interviews were conducted. Furthermore, it does not track reinforcement effects over time, making it difficult to assess the long-term psychological or behavioral consequences of dopamine-based design. These gaps restrict the generalizability of the findings.

Future research can expand on this foundation by exploring the long-term cognitive and behavioral impacts of dopamine loops in gaming. Studies could also assess the effectiveness of regulatory frameworks in controlling exploitative F2P practices, and investigate how cultural and regional differences influence player responses to these mechanics. Such research would offer a more comprehensive, globally relevant understanding of how dopamine-driven designs affect players and shape industry trends.

REFERENCES

- Berridge, K. C., & Robinson, T. E. (2016). Liking, wanting, and the incentive-sensitization theory of addiction. *American Psychologist*, 71(8), 670–679. <https://doi.org/10.1037/amp0000059>
- Billieux, J., Flayelle, M., Rumpf, H. J., & Stein, D. J. (2019). High involvement versus pathological involvement in video games: A crucial distinction for ensuring the validity and utility of gaming disorder. *Current Addiction Reports*, 6(3), 323–330. <https://doi.org/10.1007/s40429-019-00262-5>
- Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. Harper & Row.
- Davis, A., Weyandt, L., & Gunstad, J. (2021). The role of dopamine in video game engagement: A review of reinforcement-based gaming mechanisms. *Journal of Behavioral Neuroscience*, 28(2), 118–135. <https://doi.org/10.1037/bne0000421>
- Drummond, A., & Sauer, J. D. (2018). Video game loot boxes are psychologically akin to gambling. *Nature Human Behaviour*, 2(8), 530–536. <https://doi.org/10.1038/s41562-018-0360-1>
- Elson, M., & Ferguson, C. J. (2014). Does game addiction exist? *Frontiers in Psychology*, 5, Article 693. <https://doi.org/10.3389/fpsyg.2014.00693>
- Granic, I., Lobel, A., & Engels, R. C. (2014). The benefits of playing video games. *American Psychologist*, 69(1), 66–78. <https://doi.org/10.1037/a0034857>
- Griffiths, M. D. (2019). Loot box engagement: A critical review of existing research. *Gaming and Gambling Studies*, 14(3), 289–310.
- King, D. L., & Delfabbro, P. H. (2020). Video game monetization (e.g., ‘loot boxes’): A blueprint for practical social responsibility measures. *International Journal of Mental Health and Addiction*, 18(1), 1–13. <https://doi.org/10.1007/s11469-019-00115-6>
- King, D. L., Delfabbro, P. H., & Gainsbury, S. M. (2019). Mechanisms of problem video gaming: A psychological framework. *Journal of Behavioral Addictions*, 8(2), 133–146. <https://doi.org/10.1556/2006.8.2019.13>
- Király, O., Griffiths, M. D., Demetrovics, Z., & King, D. L. (2017). Policy responses to problematic video game use: A systematic review of



- international perspectives. *Computers in Human Behavior*, 68, 322–333. <https://doi.org/10.1016/j.chb.2016.11.027>
12. Ryan, R. M., Rigby, C. S., & Przybylski, A. (2006). The motivational pull of video games: A self-determination theory approach. *Motivation and Emotion*, 30(4), 344–360. <https://doi.org/10.1007/s11031-006-9051-8>
13. Slater, M. (2018). Immersion and the illusion of presence in virtual reality. *British Journal of Psychology*, 109(3), 431–452. <https://doi.org/10.1111/bjop.12305>
14. Wood, R. T., Griffiths, M. D., & Parke, J. (2007). Experience of time loss among video game players: An empirical study. *CyberPsychology & Behavior*, 10(1), 38–44. <https://doi.org/10.1089/cpb.2006.9994>

HOW TO CITE THIS ARTICLE: Kumar, S.J.N., Manohar, N. (2025). Dopamine Loops and Player Retention: A Study on Reinforcement in Free-to-Play Games. *Journal of Communication and Management*, 4(spl), 56-61. DOI: 10.58966/JCM20254spl09