



## Cognitive Biases in Digital Gambling: Insights from the South African Context

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## Cognitive Biases in Digital Gambling: Insights from the South African Context

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### ABSTRACT

**Background:** The rapid growth of digital gambling platforms has transformed consumer engagement while increasing psychological vulnerabilities, particularly cognitive biases that distort decision-making and risk perception. **Objective:** This study aims to analyse how cognitive biases influence consumer behaviour in digital gambling environments in the South African context, focusing on the interactions among cognition, platform design, and socio-economic factors. **Method:** A qualitative document analysis was employed, synthesising multidisciplinary literature from cognitive psychology, behavioural economics, and digital marketing to identify patterns of bias activation and reinforcement. **Results:** The findings reveal that overconfidence, the illusion of control, and the availability heuristic are systematically exploited through gamification, personalised marketing, and algorithmic targeting, leading to increased engagement and risk-taking behaviour. Socio-economic pressures and cultural narratives of financial mobility further intensify these effects. **Conclusion:** Cognitive biases operate within a socio-technical system where digital environments actively reinforce irrational decision-making, requiring more comprehensive intervention approaches. **Contribution:** This study offers an integrated framework that combines cognitive, technological, and contextual dimensions, advancing the development of effective consumer protection strategies, ethical platform design, and responsible gambling policies.

### 1. INTRODUCTION

The rapid expansion of digital gambling platforms has fundamentally transformed how consumers engage with gambling, offering unprecedented levels of convenience, accessibility, and personalisation. These technological advancements have enhanced user experience but have also intensified psychological vulnerabilities, particularly cognitive biases that distort judgment and decision-making processes (Badu, 2024). As digital environments increasingly incorporate algorithm-driven features, personalised advertising, and real-time engagement mechanisms, the assumption that consumers behave as fully rational decision-makers becomes increasingly untenable, highlighting the need for a more nuanced understanding of behaviour in digital gambling contexts.

Cognitive biases constitute a central mechanism underlying decision-making in uncertain environments. Rooted in Cognitive Psychology and Behavioural Economics, these biases systematically influence how individuals interpret probabilities, assess risks, and make choices. Overconfidence bias leads individuals to overestimate their ability to predict outcomes, even in games governed by randomness. Empirical evidence indicates that individuals who are overconfident in their understanding of electronic gaming machines (EGMs) tend to develop more favourable attitudes toward gambling platforms, thereby increasing engagement and risk exposure (Philander & Gainsbury, 2021). Similarly, the illusion of control fosters the belief that personal skill or rituals can influence outcomes, a perception often reinforced by interactive features such as gamification and reward-based notifications (Mihai et al.,

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2025). Availability heuristics further distort risk perception by making recent wins or highly visible success Narratives more cognitively accessible, thereby inflating perceived probabilities of success, and sustaining continued gambling engagement (Elem et al., 2024; García-Pérez et al., 2024). These biases interact dynamically, creating a psychological environment in which rational self-regulation is consistently undermined.

The effects of these cognitive distortions become more pronounced when situated within specific socio-economic and cultural contexts. In South Africa, structural inequalities, high unemployment rates, and cultural narratives surrounding financial mobility significantly influence gambling behaviour (Badu, 2024; National Gambling Board of South Africa [NGB], 2024). At the same time, the widespread adoption of smartphones and digital platforms has increased access to gambling services, while aggressive marketing strategies and algorithmic targeting intensify exposure to bias-triggering stimuli (Bahangulu & Berko, 2025; Kabir et al., 2025). These conditions create a high-risk environment in which cognitive biases are not only activated but systematically reinforced, particularly among vulnerable populations.

Previous studies have extensively examined cognitive biases in gambling, primarily focusing on individual psychological mechanisms and behavioural outcomes. Research has shown that biases such as overconfidence and illusion of control significantly influence gambling persistence, risk-taking, and decision-making patterns (Philander & Gainsbury, 2021; Mihai et al., 2025; Ruiz de Lara et al., 2019). Other studies have explored the impact of digital environments, demonstrating how gamification, personalised marketing, and reward systems enhance user engagement and spending (Badu, 2024; Kabir et al., 2025; Mathew et al., 2025). However, these studies remain largely general in scope and tend to examine cognitive processes and digital influences separately. Specific investigations that integrate cognitive biases within digital gambling environments in particular socio-economic contexts, such as South Africa, remain limited. Consequently, there is a lack of context-sensitive understanding of how cognitive biases operate and are reinforced within digitally mediated gambling systems in emerging economies.

Despite these advancements, a critical research gap persists. Existing studies have not sufficiently explained how cognitive biases interact with algorithm-driven digital gambling environments within specific socio-economic contexts such as South Africa. Furthermore, there is a lack of comprehensive frameworks that integrate cognitive, technological, and contextual factors into a unified analytical model. Limited attention has also been given to how structural inequalities and rapid digitalisation amplify cognitive vulnerabilities, particularly in emerging economies. Addressing this gap is essential to developing more holistic,

context-sensitive approaches to understanding and regulating digital gambling behaviour.

In response to this gap, this study aims to analyse how cognitive biases influence consumer behaviour in digital gambling environments within the South African context. Specifically, this research addresses the following questions: 1) How do cognitive biases shape decision-making and risk perception in digital gambling?; 2) How do platform design and algorithmic targeting reinforce these biases? And; 3) What are the implications of these interactions for consumer protection and responsible gambling policies?

To guide this analysis, the study adopts the Digital Gambling Influence Framework (DGIF) as a conceptual lens. The DGIF framework conceptualises digital gambling behaviour as the result of dynamic interactions between individual cognitive vulnerabilities, platform design features, and broader socio-economic conditions. By integrating these dimensions, the framework enables a more comprehensive understanding of how cognitive biases are activated, reinforced, and sustained within digital environments.

This study addresses an important research gap by exploring how cognitive biases shape consumer behaviour in digital gambling environments in South Africa. It brings together cognitive, technological, and socio-economic perspectives to offer a more grounded, context-sensitive understanding of why people make certain gambling decisions. The insights gained are intended to support the development of more practical consumer protection strategies, encourage more ethical platform design, and inform evidence-based regulatory approaches within the digital gambling space.

## 2. METHOD

### 2.1 Study Design

This study adopts a qualitative, document-analytic methodology complemented by a broad range of contemporary literature on cognitive bias, digital marketing, and gambling behaviour. Document analysis enables systematic extraction of themes and patterns, revealing how cognitive biases are activated and reinforced in digital gambling environments (Paré & Kitsiou, 2017). This approach allows for critical examination of both theoretical frameworks and applied practices, bridging the gap between psychological insights and practical interventions.

### 2.2 Data Sources and Selection Criteria

Sources were selected to provide a multidisciplinary perspective, prioritizing studies that link cognitive biases to digital marketing strategies and socio-cultural context. Peer-reviewed studies, policy documents, white papers, and grey literature were triangulated to provide robust evidence on both the psychological mechanisms and regu-

latory implications of bias-driven gambling (Snyder, 2019; Sukhera, 2022). This ensures that findings are contextualized within both academic and practical domains.

### 2.3 Data Analysis

Textual materials were coded according to key cognitive biases, marketing tactics, and behavioural outcomes. Each instance of bias was analyzed not in isolation but as part of a systemic interaction among individual psychology, platform design, and socio-cultural influences (Bahangulu & Berko, 2025). This approach reflects the socio-technical nature of digital gambling, emphasizing that cognitive biases are shaped as much by environmental design as by individual cognition.

### 2.4 Ethical Considerations

Ethical considerations informed the research process throughout, with the analysis focusing on general patterns rather than identifying individual gamblers or companies. This approach reflects best practice in handling sensitive topics, while ensuring the findings remain relevant and useful for regulators, policymakers and public health stakeholders (Sahak et al., 2025). The combination of methodological rigour and careful ethical safeguards supports a credible and balanced examination of cognitive biases in digital gambling.

## 3. RESULT AND DISCUSSION

### 3.1 Result

Digital gambling platforms systematically exploit cognitive biases to enhance user engagement. Overconfidence bias manifests in high-frequency gambling and elevated wager amounts, driven by the belief in skill-based prediction (Al-Hadrawi & Jawad, 2024; Lockton, 2012). Gamification features, including point accumulation, leaderboards, and interactive challenges, reinforce the illusion of control, making random outcomes appear contingent on skill (Mihai et al., 2025). Availability heuristics are exploited through reward notifications and marketing messages that highlight recent wins, skewing players' perceptions of probability and outcomes (Elem et al., 2024; García-Pérez et al., 2024).

In South Africa, these biases are amplified by socioeconomic pressures and cultural narratives around wealth and opportunity (Badu, 2024; NGB, 2024). Table 1 summarises cognitive biases observed among South African gamblers, highlighting overconfidence, social influence, and technology-driven perceptions (NGB, 2013). Marketing campaigns are strategically localised to resonate with social aspirations, while influencer marketing and social media integration provide biased social proof that reinforces cognitive distortions (Bolat et al., 2025; Rossi & Nairn, 2022). Algorithmic targeting further intensifies exposure to bias, as personalised content continuously reinforces individual vulnerabilities (Bahangulu & Berko, 2025; Chinnathurai, 2025).

Table 1. Cognitive biases identified in South African gambling behaviour

Cognitive Bias / Behaviour	Key findings
Overconfidence / Illusion of Control	Many gamblers believed they could influence outcomes or "beat the system," particularly in informal games and Losses per Minute (LPM)s, despite randomness.
Availability Heuristics / Saliency	Gamblers overestimated chances of winning due to recent wins, peer experiences, or visible advertising.
Social Proof / Peer Influence	Gambling behaviours were influenced by peers, family, and community norms; participation was often justified by seeing others gamble successfully.
Optimism Bias / Risk Underestimation	Most recreational gamblers perceived risks as low and believed losses were temporary or manageable.
Cultural / Socio-economic Framing	Betting was linked to social mobility and wealth narratives; these narratives reinforced biased perceptions of potential gains.
Technology-driven Bias	Internet and mobile gambling increased perceptions of control and opportunity, driven by convenience, frequent notifications, and gamified interfaces.

Source: NGB (2013)

The findings highlight critical implications for consumer protection. Current regulatory approaches, which often assume rational behaviour, are insufficient in mitigating bias-driven gambling risks (Bedford, 2024; Savolainen et al., 2025). Ethical interventions must explicitly account for the cognitive mechanisms that digital platforms exploit. Effective interventions should combine multiple strategies, such as modifying interface designs to mi-

nimise exploitative cues, implementing targeted nudges to address overconfidence, and providing educational programs that increase consumer awareness of cognitive biases and their potential consequences (Islam et al., 2024; Kerti, 2025). Complementing these approaches, experiential learning is particularly effective in mitigating biased gambling behaviour. Table 2 shows how hands-on learning through interactive simulations can help correct common

cognitive distortions. Participants who engaged with realistic probability-based scenarios showed clear reductions in overconfidence and misperceptions of winning odds, and these improvements were sustained over time. The

findings highlight the value of practical, engaging learning approaches as a useful complement to traditional education and regulatory measures in addressing gambling-related cognitive biases.

**Table 2.** Key Findings on cognitive bias and experiential learning in gambling

Finding- Dimension	Finding
Experiential learning as a debiasing tool	Interactive dice simulations reduced lottery play compared with traditional financial education.
Cognitive bias correction	Participants corrected overestimation of winning odds after experiencing true probabilities.
Behavioural change over time	Reduced gambling persisted immediately and up to one year after the simulation.
Differential effects by individual experience	Participants who succeeded quickly in the dice game gambled more; direct experience of low probability was more effective.
Practical implication	Brief experiential learning interventions can more effectively reduce biased gambling behaviour than traditional education.

Source: Abel, Cole, & Zia (2021)

### 3.2. Discussion

This study provides a comprehensive analysis of how cognitive biases shape consumer behaviour in digital gambling environments, particularly within the socio-economic context of South Africa. The findings demonstrate that cognitive biases, specifically overconfidence, the illusion of control, and availability heuristics, are not merely individual psychological tendencies but are systematically activated and reinforced by digital platform design and marketing strategies. This indicates that cognitive distortions operate within a broader socio-technical system rather than as isolated mental errors.

In relation to decision-making and risk perception, the findings show that overconfidence leads individuals to overestimate their ability to predict outcomes, resulting in higher betting frequency and increased financial exposure. Digital environments intensify this bias through continuous feedback mechanisms that create the illusion of learning or improvement (Cavalcanti et al., 2021). Gamified features such as points, rankings, and rewards reinforce the illusion of control by suggesting that outcomes are influenced by user skill (Papadimitriou, 2024). At the same time, availability heuristics are amplified through repeated exposure to success stories, notifications, and visible wins, which distort probability judgments and sustain engagement. These patterns suggest that cognitive biases are actively maintained through repeated interaction with digital systems.

The role of platform design and algorithmic targeting is particularly significant in reinforcing these biases (Finocchiaro et al., 2021). Digital gambling platforms utilise user data to personalise content and deliver stimuli that align with individual behavioural tendencies (Drosatos et al., 2018). This creates a feedback loop in which users are continuously exposed to bias-reinforcing cues, increasing engagement while reducing critical eva-

luation of risk. Within the Digital Gambling Influence Framework, this interaction highlights how cognitive vulnerabilities, technological features, and marketing strategies function as interconnected elements that shape behaviour. The findings, therefore, shift the focus from individual responsibility to the structural design of digital environments, raising important ethical considerations regarding the intentional use of psychological mechanisms to influence user behaviour.

The socio-economic and cultural context further amplifies these effects. In South Africa, economic pressures, unemployment, and narratives surrounding financial success contribute to the perception of gambling as a viable pathway to upward mobility. This context reinforces optimism and risk underestimation, making individuals more susceptible to cognitive distortions. Social influences (Savolainen et al., 2021; Dilaku et al., 2025), including peer behaviour and digitally mediated social proof, normalise gambling practices and strengthen biased perceptions of success. These findings demonstrate that cognitive biases are not only individual processes but are also socially constructed and contextually reinforced.

The study also reveals important limitations in current approaches to consumer protection and regulation. Many existing strategies assume that individuals can make rational decisions when provided with sufficient information (Citroen, 2011). However, the persistence of cognitive biases suggests that informational approaches alone are insufficient (Paulus et al., 2024). More effective interventions require direct engagement with the cognitive mechanisms that drive behaviour. This includes redesigning digital interfaces to reduce misleading cues, implementing behavioural nudges that counteract overconfidence, and developing educational strategies that enhance awareness of cognitive distortions. Experiential approaches are more effective in correcting misperceptions by allowing indivi-

duals to directly engage with realistic probabilities and outcomes (Dutt & Gonzalez, 2012).

This study contributes to theory by integrating cognitive psychology, socio-technical systems, and marketing ethics, thereby strengthening the understanding of gambling behaviour. It links cognitive biases to digital platform features, marketing strategies and socio-cultural factors, offering a more comprehensive framework for addressing gambling-related harms. Future research should empirically test interventions to reduce cognitive biases, particularly in low- and middle-income countries where digital gambling is expanding rapidly (Kabir et al., 2025; Volosevici & Isbasoiu, 2025).

Cognitive biases are central to understanding gambling behaviour, particularly in digital environments where platforms deliberately design stimuli to exploit psychological tendencies. Overconfidence leads individuals to overestimate their ability to predict outcomes, often resulting in higher wages and more frequent engagement (Al-Hadrawi & Jawad, 2024; Lockton, 2012). The illusion of control reinforces this behaviour by encouraging gamblers to perceive skill-based influence over inherently random outcomes (Mihai et al., 2025). Availability heuristics further distort risk perception, as recent wins or high-visibility marketing amplify expectations of success and sustain engagement (Elem et al., 2024; García-Pérez et al., 2024).

The DGIF offers a comprehensive framework for analysing these mechanisms, highlighting how digital marketing strategies deliberately exploit cognitive biases. Personalised advertisements, gamified interfaces, reward notifications, and social media-driven promotions intensify overconfidence and illusions of control while manipulating outcome salience to trigger availability heuristics (Rossi & Nairn, 2022; Torrance et al., 2021). These strategies reveal an ethical tension between commercial objectives and consumer protection, as they rely on psychological vulnerabilities to drive profit (Islam et al., 2024; Chinnathurai, 2025).

Socio-cultural factors further amplify these biases. In Sub-Saharan Africa, gambling advertisements often frame betting as a route to financial mobility or social recognition, aligning with cultural narratives that intersect with cognitive distortions (Badu, 2024; Elem et al., 2024). Influencer marketing also normalises gambling, particularly among younger populations, providing biased social proof that reinforces distorted perceptions (Bolat et al., 2025; Gainsbury et al., 2016). These findings underscore that cognitive biases are not solely individual phenomena but are socially mediated and contextually reinforced.

Despite evidence of bias exploitation, regulatory and public health interventions remain limited, especially in digital contexts. Existing initiatives often assume rational decision-making, neglecting the systematic distortions created by cognitive biases (Bedford, 2024; Savolainen et

al., 2025). Effective interventions should address these biases explicitly through ethical marketing guidelines, interface modifications, and educational programs that enhance consumer awareness and resilience (Islam et al., 2024; Kerti, 2025). A systemic, evidence-based approach integrating psychology, technology, and policy is essential to reduce gambling-related harms.

The study advances understanding through the Digital Gambling Influence Framework, which connects cognitive processes, digital technologies and socio-economic conditions. This integrative approach provides a fuller explanation of gambling behaviour than single-dimension models and highlights the interaction between individual cognition and external systems in shaping behaviour.

In practical terms, the findings are important for policymakers, regulators, and platform designers, as they can help guide better decisions, rules, and system designs. Regulatory frameworks should move beyond disclosure-based approaches to address behavioural drivers more directly (Quigley, 2020). This includes limiting exploitative design features, improving transparency in algorithmic systems and strengthening ethical standards in digital marketing. Public health initiatives should also adopt culturally sensitive strategies aligned with socio-economic conditions influencing gambling behaviour (Wheaton et al., 2024).

The study also highlights the need for further empirical research to evaluate intervention effectiveness across contexts. While it provides a strong conceptual foundation, future work should test specific approaches to reducing cognitive bias and mitigating harm in digital gambling environments.

## 4. IMPLICATIONS AND CONTRIBUTIONS

### 4.1 Implications of the Review Study

This study offers important theoretical implications by demonstrating that cognitive biases in digital gambling should be understood as outcomes of dynamic interactions within a broader socio-technical system, rather than as isolated psychological distortions. By synthesising insights from Cognitive Psychology and Behavioural Economics, the study highlights the limitations of traditional models that conceptualise decision-making as primarily individual and rational. Instead, it emphasises that cognitive processes are continuously shaped and amplified by digital infrastructures, algorithmic systems, and socio-cultural environments. This perspective calls for a shift in theoretical approaches toward more integrative frameworks that account for the co-construction of behaviour between human cognition and technological systems, particularly in digitally mediated consumption contexts.

## 4.2 Contributions of the Review to the Literature

This study contributes to the literature by developing an integrated conceptual framework for understanding cognitive biases in digital gambling, grounded in the Digital Gambling Influence Framework. The contribution lies in bridging previously fragmented domains, namely psychological processes, digital platform design, and socio-economic context, into a unified analytical model. Unlike prior studies that examine these elements in isolation, this research advances a holistic perspective that explains how cognitive biases are activated, reinforced, and sustained within digital environments. Furthermore, by situating the analysis within the context of South Africa, the study extends theoretical discourse by highlighting the role of contextual and structural factors in shaping behavioural outcomes. This integrative approach not only refines existing theories of decision-making but also provides a foundation for future conceptual and empirical research on bias-driven behaviour in technology-mediated environments.

## 5. FUTURE RESEARCH DIRECTIONS

### 5.1 Limitations of the Review Study

This study has several limitations that should be acknowledged. First, as a literature review, the findings are based on the synthesis of existing studies rather than primary empirical data, which may limit the ability to capture real-time behavioural dynamics in digital gambling environments. Second, the analysis relies on the availability and scope of prior research, which remains uneven across regions, with relatively limited empirical evidence from contexts such as South Africa and other emerging economies. Third, although this study adopts an integrative perspective, the proposed framework is conceptual in nature and has not been empirically validated. Additionally, variations in methodologies, sample populations, and research designs across the reviewed studies may introduce inconsistencies that affect the generalisability of conclusions. These limitations highlight the need for caution in interpreting the findings and underscore the importance of further empirical validation.

### 5.2 Recommendation for Future Research Directions

Future research should empirically test the conceptual relationships proposed in this study, particularly the interactions among cognitive biases, digital platform design, and socio-economic factors. Quantitative and experimental studies are needed to examine the causal mechanisms through which cognitive biases are activated and reinforced in digital gambling environments. In addition, longitudinal research could provide deeper insights into how exposure to algorithmic targeting and gamified features influences behaviour over time. Further studies should also examine cross-cultural comparisons to understand

better how contextual factors shape cognitive vulnerabilities across regions. Expanding research in emerging economies, including South Africa, would be particularly valuable for developing context-sensitive theoretical models. Finally, interdisciplinary approaches that integrate insights from psychology, data science, and sociotechnical systems are essential to advancing a more comprehensive understanding of bias-driven behaviour in increasingly digital, algorithm-driven environments.

## 6. CONCLUSION

Cognitive biases play a key role in shaping consumer behaviour within South Africa's rapidly growing digital gambling environment. Distortions such as overconfidence, availability heuristics and the illusion of control influence risk perception and decision-making, often leading to overestimation of winnings and continued engagement. These effects are intensified by digital platform features, including targeted marketing, algorithm-driven personalisation and interactive design elements that reinforce engagement and weaken critical risk assessment. The Digital Gambling Influence Framework shows that gambling behaviour emerges from the interaction among cognition, technology, and socio-cultural conditions rather than from individual decision-making alone. Addressing these challenges requires integrated interventions such as bias-targeted nudges, ethical platform design, stronger regulation and consumer education, alongside further empirical research to assess their effectiveness in reducing harm and promoting responsible gambling.

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## CRedit Authorship Contribution Statement

The author declares sole responsibility for the conceptualisation, literature review, methodology, analysis, and writing of this manuscript. All aspects of the research were conducted independently, and no other individual contributed as a co-author or made any substantial contribution to the content of this work.

## Declaration of GenAI Usage in Scientific Writing

The author declares that Generative Artificial Intelligence (GenAI) tools were used exclusively to assist in language refinement, grammar correction, and improving clarity during the preparation of this manuscript. All intellectual contributions, including conceptual development, critical analysis, synthesis of literature, and interpretation of findings, were conducted independently by the author. The author has carefully reviewed and validated all AI-assisted outputs to ensure accuracy, originality, and adherence to academic integrity standards, and assumes full responsibility for the final content of the manuscript. All instances of Generative AI usage in this article were conducted by the authors in accordance with the [IJCP GenAI Tool Usage Policy](#), with the authors assuming full responsibility for the originality, accuracy, and integrity of the work.”

## Conflict of Interest Statement

The author declares that there are no conflicts of interest related to this study. The author confirms that the manuscript has been reviewed and approved and that there are no financial, personal, or professional interests that could have influenced the work reported in this article.

## Informed Consent Statement

The author declares that this study is based on a qualitative document analysis of previously published scholarly literature and does not involve human participants, personal data, or experimental procedures. Therefore, informed consent was not required. The study was conducted in accordance with established academic and ethical standards, ensuring proper citation and responsible use of all referenced materials.

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