A Systematic Review on Cognitive Biases in Gambling activities and Gambling Addiction

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Introduction

- Gambling is defined as any activity characterized by a **wager of money**/something valuable, with an **irreversible bet** and an outcome based on **chance** (Ladouceur, 2004)
- Gambling activities involve risk taking and could possibly induce irrational decision-making, leading to **cognitive distortions**
- Cognitive distortions consist of **misbeliefs** about skills, where the random nature of events is not considered (Ladouceur, 2004) and affects the perceived probability of winning

Aims

This systematic review aimed to :
- Investigate **cognitive** and **perceptive distortions** & **gambling characteristics features** studied previously
- Understand how they **influence perception of probability** and **chances of winning**
- Contribute to the creation of **less addictive** gambling games

Methods

- Prospero : CRD42023493755 (registered on 25th December 2023)
- Search strategy : (gambling AND game) OR (gambling AND simulator) OR (slot AND machine AND play)) AND ((gambling AND behavior) OR (gambling AND addiction)) AND ((cognitive AND bias) OR (perceptive AND bias) OR (perception AND of AND randomness) OR (probability AND of AND judgment))
- Databases : Scopus, PubMed, APA PsycInfo, Google Scholar and Econbiz

Inclusion criteria	Exclusion criteria
English written, peer-reviewed, experimental-quantitative papers, involving (non) pathological populations & gambling-simulated tasks, gamblers' perception of outcm's probability and chance	Skill-based games (e.g. poker), non-cognitive based experiments

Figure 1. PRISMA Flow Chart

Results

We clustered the content of the reviewed articles into 3 macro-themes: **gambling features**, referring to structural gambling's characteristics (e.g. sounds, colors), **cognitive distortions**, defined as irrational thinking regarding outcomes of gambling games, and **studies comparing between pathological gamblers (PGs) and non-PGs.**

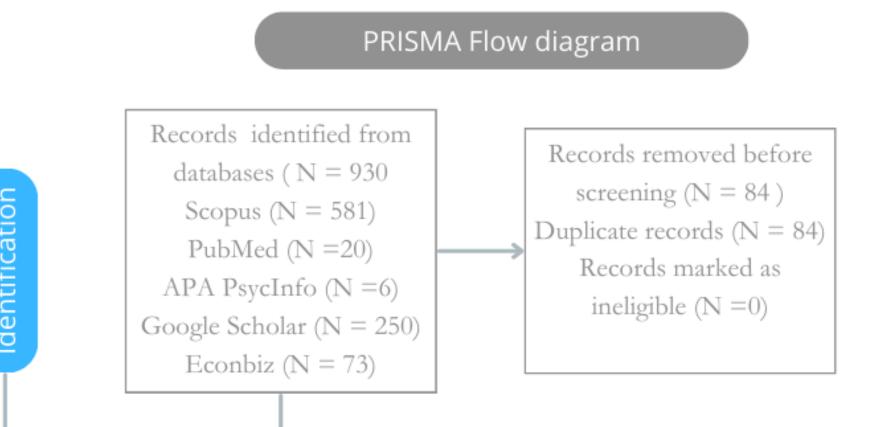| Gambling features	Cognitive Distortions	PGs VS non-PGs
• Various aspects of gambling (e.g., game design, element placement) influence gamblers' perception of winning chances • Near-misses can increase frustration, lead to higher bets, and extend playtime. • Reward programs and incentives in gambling platforms attract users and increase the risk of gambling problems. • Warning messages studies shown inconsistent results questioning their effectiveness	• Different presentation formats of probabilities impact gamblers' perception in gambling. • Cognitive distortions influence decision-making by obstructing the use of optimal probability estimations. • The illusion of control leads to increased wagering. • The gambler's fallacy contribute to persistence in certain gambling behaviors, feeding the illusion of control.	• PG more likely base probability estimations on cognitive distortions and affective factors, leading to higher bets and influence from the gambler's fallacy. • There is a stable association between cognitive distortions and gambling problems, with PGs exhibiting more

Discussion/conclusion

We identified intricate **relationships** between **perception**, **decision-making**, and **problem gambling** tendencies. Various factors such as the presentation of probabilities, individual differences in cognitive distortions, and affective influences contribute to the formation of biased perceptions and behaviors among gamblers.

The association between cognitive distortions and gambling problems is well-established, with cognitive distortions positively correlated to gambling symptoms. **PGs** exhibit **more cognitive distortions** than regular gamblers, further emphasizing the role of distorted perceptions in the **development and maintenance of gambling problems**.

The review has enabled a deeper understanding of how cognitive biases and game design features influence gambling behaviors, which is crucial for developing more effective prevention and treatment strategies.

Future research should continue to explore the intricate mechanisms underlying cognitive biases and gambling characteristic features to mitigate gambling problems and develop less addictive games.

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