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REVIEW ARTICLE

Relapse in disordered gambling: a systematic review from a biopsychosocial perspective

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ABSTRACT

Background: Relapse is common among individuals undergoing treatment for gambling disorder (GD). Understanding the biological, psychological, and social (biopsychosocial (BPS)) factors that influence relapse in GD is important to guide clinical practice and improve treatment efficacy. However, evidence synthesis in this area is warranted to provide clarity and cohesion to the literature.

Method: A systematic review of empirical research (2015–2026) was conducted. Included studies focused on factors that either predicted relapse in GD, or those that offered protection against relapse. Findings were synthesized according to the BPS model (PROSPERO ID: CRD42024521445).

Results: Twenty-six studies were included in the review. Overall, studies lacked heterogeneity, with most conducted in Spain ($n = 19$) and deriving from the same participant groups ($n = 14$). Biological factors such as younger age were associated with higher rates of GD relapse. Psychological predictors encompassed alcohol/substance use, personality traits (higher harm avoidance and lower self-directedness), cognitive factors (cognitive distortions, low cognitive flexibility, impulsivity), and poor psychopathological state. Social factors such as marital status (being single, divorced, or separated), lower education levels, involvement in crime, and exposure to gambling advertising also contributed to relapse risk. Relatedly, familial support, engaging in meaningful activities, and attendance at self-help meetings were protective against relapse.

Conclusions: Overall, a broad range of BPS factors influence GD relapse. Despite the lack of heterogeneity in the included studies, these findings may contribute to better therapeutic understanding and practice. Expanding this research area is crucial for improving long-term recovery outcomes in GD.

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Gambling disorder; pathological gambling; relapse; risk factors; protective factors; biopsychosocial model

Background

Gambling disorder (GD) is a significant public health issue, associated with harms such as financial losses, relationship breakdown, mood disorders, and suicide (Potenza et al. 2019; Wardle et al. 2024). The impacts of GD are not only limited to the gamblers themselves, but very often extend to affected others (e.g. family and friends) as well (Li et al. 2017). Several clinical criteria for GD exist, such as impaired control over gambling, a preoccupation with gambling, and continuation despite negative consequences. The most current criteria are those defined by the DSM-5 (APA 2013) and ICD-11 (WHO 2019). Previous iterations of these criteria were also provided within the DSM-IV (APA 1994) and ICD-10 (WHO 2016) under the term 'Pathological Gambling'. Although there are discrepancies between and within versions of the DSM and ICD, GD is broadly defined by persistent or recurrent gambling behaviors that lead to significant distress and impairment (APA 2013; WHO 2019).

A wealth of research has focused on the effective treatment of GD via approaches such as psychotherapy (Ribeiro et al. 2021; Pfund et al. 2023), peer-support (Schuler et al. 2016), brief interventions (Quilty et al. 2019), and more recently, pharmacological approaches (Kraus et al. 2020; Ioannidis et al.

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2025). The primary aim of these treatments is to facilitate recovery, which is often operationalized as either abstinence from gambling or the absence of a GD diagnosis (Mansueto et al. 2024).

Even after extended periods of abstinence, those recovering from a GD have reported the challenges in resisting 'intense urges' and described their 'confidence and self-esteem taking a severe hit' (van Baal et al. 2024). Recovery is therefore not a linear process, and it is common for those with a GD to experience multiple cycles of treatment, abstinence, and relapse (Reith and Dobbie 2012; Oakes et al. 2019). This 'merry-go-round' of relapse is complex and therefore represents a discernible threat to the long-term efficacy of available treatments (Aragay et al. 2015; Müller et al. 2017). For example, previous research indicates that the rates of relapse among those in receipt of treatment for a GD range from approximately 22% to as high as 92% (Hodgins and El-Guebaly 2004; Grall-Bronnec et al. 2021). Additional complexity also surrounds the very definition of relapse within the gambling literature. Many studies strictly characterize relapse as a departure from abstinence, that is, any instance of gambling during the treatment period or at follow-up (Mansueto et al. 2024). However, relapse remains semantically ambiguous due to some studies also defining it by more than two or three gambling episodes (Aragay et al. 2015; Echeburúa et al. 2017), or gambling more than the target frequency set prior to treatment (Ledgerwood and Petry 2006). The challenge of defining relapse also extends beyond traditional gambling, as for example the line between gambling and financial trading becomes increasingly blurred (Newall and Weiss-Cohen 2022). This process of 'gamblification' may lead to financial trading being relapse-relevant if it serves the same psychological function and poses similar risks as gambling (Grall-Bronnec et al. 2017; Mosenhauer et al. 2021; Lee et al. 2023).

Relapse is influenced by numerous established factors. For example, previously highlighted *predictive factors* include: the presence of cognitive distortions (Hodgins and El-Guebaly 2004), experiencing gambling-related urges (Smith et al. 2015), and comorbid conditions such as mood disorders (Ledgerwood and Petry 2006). Conversely, *protective factors* such as treatment adherence have also been recognized (Moreira et al. 2023). Most of these predictive and protective factors have been emphasized in previous reviews (Ledgerwood and Petry 2006; Merkouris et al. 2016). The most recent systematic review on this topic identified several risk factors for relapse following psychological treatment for GD, including younger age, female gender, higher pretreatment gambling severity, elevated depression levels, greater alcohol use, and certain personality traits such as high novelty seeking and neuroticism. Lower treatment session attendance was also associated with poorer outcomes across multiple follow-up periods (Merkouris et al. 2016). However, the gambling landscape has changed considerably since this review was published. Mobile apps and online platforms have expanded rapidly, offering instant access to a wide range of gambling products, including an ever-growing selection of online slot games, which tend to be among the most harmful forms of gambling (Wardle et al. 2024). More broadly, online gambling has become the dominant mode of participation in recent years and has itself emerged as one of the strongest risk factors for GD (Allami et al. 2021). Gambling advertising has also increased substantially, raising concerns about its potential to undermine recovery efforts among those seeking to reduce or stop gambling (Lopez-Gonzalez et al. 2020; Tessier et al. 2025). Given these shifts, reviews conducted nearly a decade ago are unlikely to capture research involving participant samples that reflect how people now gamble. The gambling population itself has also evolved alongside this changing environment, with new demographic groups being drawn to gambling, and cognitive processes around risk and reward likely shaped by the structural characteristics of newer game types (Dellosa and Browne 2024). Despite these developments, the synthesized evidence on relapse risk has not kept pace. Our understanding of relapse remains fragmented, with mixed findings and considerable heterogeneity across the existing literature (Smith et al. 2015; Müller et al. 2017; Mansueto et al. 2024). An updated synthesis is therefore needed to capture these shifts and inform contemporary treatment approaches. However, this synthesis should also be framed by a theoretical model that provides additional clarity and practical utility.

The biopsychosocial (BPS) model (Engel 1977) is well-established and offers a comprehensive perspective of physical and psychological health determinants (Wade and Halligan 2017). The BPS model therefore provides an appropriate theoretical framework to better understand the extensive and idiosyncratic nature of relapse in GD (Smith et al. 2015). Relatedly, Sharpe (2002) specifically adapted this framework for gambling, proposing that GD arises from the dynamic interaction of: biological vulnerabilities (e.g. genetic predispositions and neurobiological factors),

psychological processes (e.g. cognitive distortions and learning mechanisms), and social–environmental influences (e.g. gambling accessibility). From a wider perspective, the BPS model has also proven effective in previous reviews of relapse in other complex conditions such as alcohol use disorder (AUD; Sliedrecht et al. 2019) and schizophrenia (Maramis et al. 2022). Factors influencing relapse, via the integrative perspective of the BPS model, could therefore be beneficial in guiding clinical practice and intervention development in this area (Álvarez et al. 2012; O'Neill 2017).

As we have shown, relapse in GD is common and poses a considerable risk to treatment efficacy alongside the health and motivation of service-users (Reith and Dobbie 2012; Oakes et al. 2019; Grall-Bronnec et al. 2021). However, there is a lack of recently synthesized evidence surrounding this topic that could inform clinical practice and prevention strategies. Therefore, through the lens of the BPS model, this narrative systematic review aims to examine and synthesize the recent empirical evidence (2015–2026) relating to the factors that influence relapse in GD.

Methods

Information sources and search strategy

In line with PRISMA guidelines (Page et al. 2021), literature searches of peer-reviewed studies that explored factors influencing relapse in GD were conducted. The preregistered search initially covered the period from 1 January 2015 to 1 January 2025. To account for the time elapsed during the peer review process, the search was re-run across all databases in March 2026, extending coverage to 1 March 2026. This updated search did not identify any additional studies meeting the inclusion criteria. We operationalized 'influential factors' as any factor that either predicted relapse or those that provided a protective effect against relapse in GD. Four academic databases (PubMed, SCOPUS, Web of Science, and PsycINFO) were utilized alongside Google Scholar to retrieve any further records (see Figure 1). The search strategy combined three concept groups using the Boolean operator AND. The first group targeted gambling-related terms: (gambl* OR wager* OR betting). The second group targeted relapse-related terms: (relaps* OR abstinen* OR 'treatment outcome*' OR recurrence). The third group targeted the directionality of influence: (risk* OR predict* OR protecti*). Within each group, terms were combined using OR to maximize sensitivity. The full search equation was therefore: (gambl* OR wager* OR betting) AND (relaps* OR abstinen* OR 'treatment outcome*' OR recurrence) AND (risk* OR predict* OR protecti*). This equation was applied to the title, abstract, and keyword fields across all four databases. In PubMed, the strategy was supplemented with relevant Medical Subject Headings (MeSH), specifically 'Gambling' [MeSH] and 'Recurrence' [MeSH], combined using AND. Minor syntactic adjustments to the search string were made across databases to accommodate platform-specific requirements (e.g. field tags in PubMed vs. SCOPUS), but the core logic remained consistent. Due to the variation in methodologies across the literature, we deemed a meta-analysis unfeasible and therefore opted to undertake a narrative systematic review. The protocol for the current review was preregistered via Prospero (ID: CRD42024521445).

Inclusion and exclusion criteria

Peer-reviewed quantitative, qualitative, and mixed-methods studies published in English between 01 January 2015 and 1 March 2026 were included. This timeframe was chosen to focus on the emergent literature with the additional aim of complementing and extending previous reviews without overlap (Merkouris et al. 2016). We also aimed to ensure that the review reflects more contemporary gambling environments and behaviors to more appropriately inform current clinical and harm reduction practices. However, this timeframe necessitated the inclusion of some studies adopting the 'pathological gambling' classification, reflecting the timing of their data collection and publication. Included studies were required to use either gold-standard diagnostic criteria for GD, including the DSM-IV, DSM-IV-TR, and DSM-5, or validated screening tools like the Problem Gambling Severity Index (PGSI; scores 8+). Given the ambiguity surrounding the term 'relapse' in the literature, we chose not to impose our own operational definition during the search. This approach allowed us to capture the full breadth of relapse definitions currently in use, thereby enabling us to better understand both the extent of this ambiguity and its implications for the field. We therefore adhered to the definition of relapse as provided in each respective study, documenting these definitions during data extraction to enable comparison in the synthesis. Included studies were also required to involve participant samples above 18 years of age, including those with comorbid conditions, to ensure a comprehensive and diverse narrative

synthesis. Conversely, exclusion criteria included non-peer-reviewed publications (e.g. dissertations and theses) and systematic reviews or meta-analyses. The latter were excluded because our objective was to provide an original synthesis of primary studies rather than conduct an umbrella review. Furthermore, studies exclusively focused on treatment 'drop out' (where relapse was indistinguishable), studies published before 2015, discussion or commentary articles, non-English publications, those involving participants under 18, and studies that did not employ recognized diagnostic criteria or validated screening tools were excluded.

Screening and quality assessment

After collecting records from database searches (n = 1341) and Google Scholar (n = 35), duplicates were removed (n = 425). Subsequently, an initial screening of titles and abstracts (n = 951) was conducted to exclude records based on the criteria outlined above. The remaining records (n = 100) were full text screened by the research team. We calculated Krippendorff's alpha (α) of 0.94, indicating excellent intercoder reliability (Hayes and Krippendorff 2007). However, the screening team (the first six authors) also held subsequent meetings to discuss and rationalize each inclusion or exclusion decision. Through these discussions, we achieved full consensus (α = 1.0) on all decisions. At the full-text stage, 74 reports were excluded for three reasons: relapse was not included in any formal analysis (n = 52), no recognized diagnostic criteria or validated screening tool was used to identify GD (n = 19), or the sample did not meet eligibility criteria (n = 3). Following full-text screening, we implemented a quality assessment via the Mixed Methods Appraisal Tool (MMAT). The MMAT is widely adopted and allows for the concomitant appraisal of diverse study designs included in mixed study systematic reviews (Hong et al. 2018). We determined that all of the final set of records (n = 26) were conducted to at least a good methodological standard according to the MMAT, and these were subsequently included for full data extraction (see Figure 1 for further details).

Analysis

Narrative synthesis was conducted to identify themes across the included studies (Popay 2006; Lisy and Porritt 2016). This process involved repeated readings of the studies, the identification and extraction of relevant data, and summarizing this data in tabular format (see Table 1). The BPS model was then utilized in order to provide a theoretical structure in the synthesis and presentation of this data (Sinkovics 2018). Narrative synthesis was conducted by the lead author. However, regular consultation with the research team also took place to ensure that extracted findings were categorized under the most appropriate 'theme' (or component) of the BPS model.

Findings

Twenty-six studies were included in the review: 21 quantitative studies; four qualitative studies, relying on in-depth interviews; and one study that utilized a mixed-methods approach, combining a Delphi study with a subsequent prospective-cohort design. Among the 21 quantitative studies, the majority employed prospective cohort or longitudinal designs (n = 17), while two adopted a cross-sectional design (Valenciano-Mendoza et al. 2021) or a combined cross-sectional and longitudinal approach (Mallorquí-Bagué et al. 2019), one used a retrospective multi-level design (Ouellet and Queloz 2018), and one employed a naturalistic follow-up with a case-control approach (Ramos-Grille et al. 2015). Findings from cross-sectional designs are limited to demonstrating associations rather than temporal predictions, and this distinction is maintained in the synthesis below. The studies were conducted across five jurisdictions that included: Spain (n = 19), Canada (n = 3), Norway (n = 2), France (n = 1), and Australia (n = 1). Collectively, these studies included an aggregate sample of 8202 participants whereby the DSM-5 (n = 15), DSM-IV (n = 5), DSM-IV-TR (n = 3), and PGSI (n = 3) were used to confirm disordered (or pathological) gambling status. Regarding the definitions of relapse: 12 of the studies characterized it as any deviation from abstinence; two studies described it as either two or more isolated gambling episodes or a single session marked by a loss of control; two studies identified relapse as the reemergence of GD or 'problem gambling' after a period of remission; one study defined it as three or more 'lapse' episodes; one study characterized it as an episode of gambling deemed unacceptable relative to the treatment goal; and eight studies offered no specific definition (see Table 1). Studies identified influential factors across all three BPS domains: biological (n = 3), psychological (n = 19), and social (n = 16). Below, we

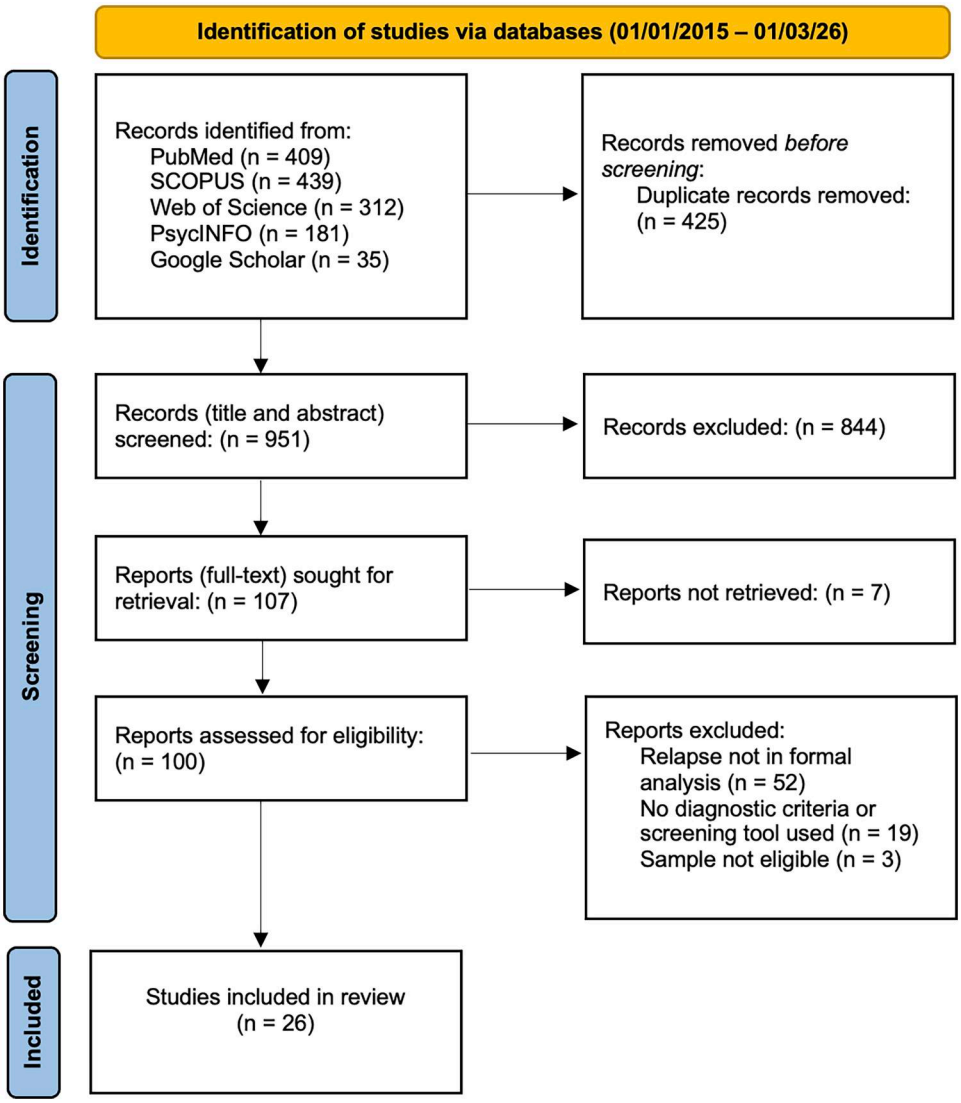

Figure 1. Preferred reporting items for systematic reviews and meta-analyses (PRISMA) flow diagram (Page et al. 2021).

present these factors along with their synthesized findings, organized by the components of the BPS model (see Table 2).

Biological factors

Sex and age

The evidence concerning sex and GD relapse remains ambiguous due to conflicting findings and methodological inconsistency. In a cross-sectional study, Valenciano-Mendoza et al. (2021) found that women had a significantly higher rate of relapse compared to men ($p < .001$), using DSM-5 criteria among a large sample of participants ($n = 1112$) undergoing outpatient CBT. The effect size for this association between gender and relapse was small-to-moderate (Cramer's $V = 0.121$). However, as this was a cross-sectional design, these findings reflect an association rather than a prospective predictive relationship. In contrast, Ouellet and Queloz (2018) used a retrospective multilevel design and identified male sex as a significant predictor of GD relapse ($p < .05$), employing the PGSI among a smaller sample of participants ($n = 100$) undergoing what was only described as 'therapy'. Specifically, men were 1.78 times more likely to relapse than women (OR = 1.781, 95% CI: 0.949–3.341).

Only one included study identified age as a significant predictor of relapse. Echeburúa et al. (2017) conducted a prospective survival analysis to predict relapse after CBT for GD in patients ($n = 35$) with chronic schizophrenia. In this context, being younger in age was reported as being a significant relapse predictor ($p = .02$). However, the small sample size limits the precision of this estimate.

Table 1. Summary of included study characteristics and findings.

Authors (date)	Setting	Design	Gambling disorder/ harm screener[a]	Definition of 'relapse'	Aims and objectives	Quality assessment (MMAT)	Factors influencing relapse		
							Biological	Psychological	Social
Aragay et al. (2015)	Spain	Prospective single-center cohort study of outpatients ($n = 566$) diagnosed with pathological gambling (PG) who underwent cognitive-behavioral treatment.	DSM-IV-TR	'More than two episodes of gambling documented at two consecutive visits or one gambling episode that showed no sense of control'	(1) To determine predictors of relapse and dropout in a large sample of pathological gamblers attending a dedicated PG unit. (2) To investigate the time to the first relapse over an extended follow-up period.	*****	N/A	Higher scores on the Temperament and Character Inventory (TCI-R) harm avoidance personality dimension were a significant predictor of relapse.	Being single and spending €0–€100 (low amounts) on gambling per week were significant predictors of relapse.
Baño et al. (2021)	Spain	Prospective cohort study examining the effectiveness of a 16-week group cognitive-behavioral therapy program for women ($n = 219$) with gambling disorder.	DSM-5	'The presence of a gambling episode once treatment had been started'	(1) To estimate the short-term effectiveness of a standardized group CBT program. (2) To identify the most relevant predictors of the primary therapy outcomes.	*****		Participants who consumed illegal drugs had a higher frequency of relapse. Those who reported a preference for non-strategic gambling had a higher risk of relapse	(1) Risk of relapse was higher for participants who did not report gambling-related debts. (2) Relapse risk was also higher for participants reporting lower education levels and being divorced.
Côté et al. (2020)	Canada	In-depth qualitative interviews of disordered gamblers and their partners ($n = 18$). Disordered gamblers were recruited from three treatment centers for disordered gambling in Quebec.	PGSI (score of 8+)	N/A	(1) To assess the impact of coping strategies used by partners of PGs on the gambling habits of their spouse. (2) To compare perceptions of PGs and their partner regarding the effectiveness of these strategies.	*****	N/A	N/A	(1) Engaging in positive and enjoyable activities with partners and family helped to occupy attention and prevent relapse. (2) Positive reinforcement of sobriety behaviors from partner (such as encouragement and congratulations) helped prevent relapse.
Gomes and Pascual-Leone (2015)	Canada	Longitudinal design following disordered gamblers ($n = 50$) in treatment. Assessments implemented at baseline, 1 month, 2 months, and 4 months after treatment began.	PGSI (score of 8+)	'Both the number of gambling incidents in the past month as well as the treatment goal and acceptability of the gambling given the treatment goal'	To examine how recovery resources and psychosocial stressors, either during the early stages or the late stages of the recovery process, predict positive treatment outcomes.	*****	N/A	Low abstinence self-efficacy was a significant negative predictor of relapse 2 months after treatment began.	Life stress was positively correlated with relapse 2 months after treatment began.

(*Continued*)

Table 1. Continued.

Authors (date)	Setting	Design	Gambling disorder/ harm screener[a]	Definition of 'relapse'	Aims and objectives	Quality assessment (MMAT)	Factors influencing relapse		
							Biological	Psychological	Social
Echeburúa et al. (2017)	Spain	A survival analysis examining therapeutic failure and relapse rates in individuals ($n = 35$) with chronic schizophrenia and gambling disorder who underwent cognitive-behavioral therapy and pharmacological treatment.	DSM-5	'Three or more lapse episodes in the follow-up period'	To predict the risk of therapeutic failure or relapse among patients diagnosed with GD.	****	Being of a younger age was a significant predictor of relapse.	N/A	(1) Having a low weekly allowance was a significant predictor of relapse. (2) Lower education level was also a significant predictor of relapse
Grall-Bronnec et al. (2021)	France	A 5-year prospective cohort design to examine predictive factors associated with GD relapse among participants ($n = 87$) who had previously achieved recovery.	DSM-5	'The presence of GD (according to the DSM-5) at the Nth + 1 visit following the absence of GD at the Nth visit'	To determine factors that could predict relapse in GD with a specific focus on dynamic variables (i.e. that can evolve over time) so that a change at a visit can predict a potential relapse at the next visit.	****	N/A	Lower scores on the Temperament and Character Inventory (TCI-125) self-directedness dimension significantly predicted relapse.	N/A
Granero et al. (2020)	Spain	A longitudinal study comprising assessments before, immediately following, and monthly during a 6-month period following a cognitive-behavioral therapy (CBT) program for GD patients ($n = 192$).	DSM-5	'The presence of any gambling episode during which the patients make some kind of bet'	(1) To use growth curve modeling to estimate response trajectories of the GD progression during short-term follow-up (6 months) after a group CBT treatment. (2) To assess the discriminative capacity of sociodemographic and clinical profiles at base- line to differentiate between empirical trajectories.	*****	N/A	Participants with the worst psychopathological state (according to the SLR-90), the highest harm avoidance levels, and the lowest self-directed- ness scores (according to TCI-R) were more likely to relapse.	Participants with low education levels and those from low socio-economic status groups were more likely to relapse.
Jiménez-Murcia et al. (2015)	Spain	Cohort design with a prospective 3-month follow-up, analyzing a sample of patients ($n = 440$) who received group CBT for gambling disorder.	DSM-IV	'One or more gambling episodes'	(1) To describe posttreatment changes in patients' psychopathology and gambling behavior using the South Oaks Gambling Screen (SOGS) and Symptom Checklist-Revised	*****	N/A	Higher scores on the Temperament and Character Inventory (TCI-R) self-transcendence dimension were a significant predictor of relapse.	The collaborative involvement of a partner or spouse throughout the CBT treatment was a significant predictor of relapse.

(*Continued*)

Table 1. Continued.

Authors (date)	Setting	Design	Gambling disorder/ harm screener[a]	Definition of 'relapse'	Aims and objectives	Quality assessment (MMAT)	Factors influencing relapse		
							Biological	Psychological	Social
					(SCL-90-R). (2) To assess the potential moderator effect of sex on treatment outcome. (3) To explore sociodemographic data, psychopathological symptoms, and personality traits as predictors of treatment outcome, including dropout and relapse during treatment and follow-up.				
Jiménez-Murcia et al. (2016)	Spain	Cohort design to analyze the association between alcohol consumption and short-term treatment outcomes in male patients ($n = 111$) with gambling disorder undergoing group CBT.	DSM-IV	N/A	(1) To analyze the association between alcohol consumption and short-term response to treatment (post-intervention) in male patients with gambling disorder enrolled in a group cognitive behavioral therapy (CBT) program	*****		Being categorized as either at-risk for an alcohol use disorder or dependent upon alcohol via the Alcohol Use Disorders Identification Test (AUDIT) was a significant predictor of relapse.	N/A
Jiménez-Murcia et al. (2017)	Spain	Cohort design to examine the effectiveness of including a concerned significant other (CSO) in CBT for male patients ($n = 675$) with gambling disorder.	DSM-IV-TR	N/A	(1) To compare treatment outcomes in group CBT involving a CSO to treatment as usual (TAU), without a CSO. (2) To explore the relationship between treatment outcomes and the type of CSO involved (spouse/partner versus others). (3) To compare sociodemographic, clinical, and personality variables between patients in	****	N/A	N/A	The collaborative involvement of a partner or spouse throughout the CBT treatment significantly reduced the risk relapse.

(*Continued*)

Table 1. Continued.

Authors (date)	Setting	Design	Gambling disorder/ harm screener[a]	Definition of 'relapse'	Aims and objectives	Quality assessment (MMAT)	Factors influencing relapse		
							Biological	Psychological	Social
					the CSO group and TAU group.				
Lara-Huallipe et al. (2022)	Spain	Longitudinal investigation using survival analysis and clustering techniques to identify distinct profiles of CBT outcomes in women ($n = 163$) with gambling disorder.	DSM-5	N/A	To explore the existence of empirical clusters in a sample of women diagnosed with GD and treated with CBT based on a large set of indicator/ predictor variables.	****	N/A	(1) High risk of relapse associated with higher number of DSM-5 symptoms for GD. (2) The worst psychological state according to the Symptom Checklist-Revised (SCL-90-R). (3) Higher scores on the Temperament and Character Inventory (TCI-R) harm avoidance dimension, and lower scores on the self-directedness dimension.	(1) High risk of relapse associated with being single, divorced or separated. (2) Not actively working. (3) Lowest level of debts
Lopez-Gonzalez et al. (2020)	Spain	In-depth qualitative focus groups involving sports bettors ($n = 43$) undergoing treatment for gambling disorder.	DSM-IV	N/A	To explore how problem sports bettors perceive gambling marketing is affecting them.	*****	N/A	N/A	Gambling advertisements, particularly financial inducements (such as 'free' bets) were reported to be a key contributor to relapse.
Lucas et al. (2023)	Spain	Longitudinal design involving participants diagnosed with gambling disorder ($n = 1699$) who received CBT. participants were assessed for treatment outcomes like relapse and dropout rates based on gambling preferences and sex differences	DSM-5	'The presence of a gambling episode once the intervention started'	To precisely define how the years from the onset of GD relate with the non-response to treatment in consideration of various GD profiles.	*****	N/A	Significant predictors of relapse were higher scores on the South Oaks Gambling Screen (SOGS) and worse psychopathological state prior to treatment, according to the Symptom Checklist-Revised (SCL-90-R).	N/A
Mallorquí-Bagué et al. (2018)	Spain	Cohort design to analyze the impact of executive functioning on treatment response	DSM-5	'The occurrence of a gambling episode once treatment had begun'	To longitudinally explore the impact of impulsivity and compulsivity on GD treatment outcome.	*****	N/A	(1) Trait impulsivity (UPPS-P negative urgency) was a significant predictor of relapse at week	N/A

(*Continued*)

Table 1. Continued.

Authors (date)	Setting	Design	Gambling disorder/ harm screener[a]	Definition of 'relapse'	Aims and objectives	Quality assessment (MMAT)	Factors influencing relapse		
							Biological	Psychological	Social
		among a sample of male participants ($n = 144$) in undergoing CBT for GD.						5 of treatment. (2) Low cognitive flexibility was also a significant predictor of relapse at follow-up (according to higher number of preservative errors on the Wisconsin Card Sorting Task; WCST)	
Mallorquí-Bagué (2019)	Spain	Cross-sectional and longitudinal design aimed at predicting relapse among male treatment-seeking patients ($n = 205$) diagnosed with gambling disorder.	DSM-5	'A full gambling episode once CBT treatment started, regardless of whether the relapse occurs with the specific type of the gambling preference or another. That means any gambling episode constitutes a relapse'	To characterize profiles of impulsivity and cognitive distortions in the strategic/non-strategic and online/offline GD clinical phenotypes, and the longitudinal association between these profiles and treatment outcomes.	****	N/A	(1) Trait impulsivity (UPPS-P negative urgency) was a significant predictor of relapse. (2) Cognitive distortions relating to one's ability to stop gambling and interpretative biases (Gambling-related Cognitions Scale; GRCS) were also significant predictors of relapse.	N/A
Mena-Moreno et al. (2022)	Spain	Longitudinal observational study that assesses the relationship between delay discounting, gambling disorder severity, and treatment outcomes in a sample of male patients ($n = 133$) undergoing CBT.	DSM-5	'A relapse indicates that the patients present a full gambling episode'	(1) To examine the baseline association between DD and clinical variables in GD patients depending on their age and gambling preferences (strategic vs. non-strategic). (2) To estimate the predictive role of DD on poorer outcomes of CBT when considering also the effect of other clinical variables.	****	N/A	A steeper discount rate (within a delayed-discounting task) significantly predicted a higher risk of relapses in both strategic and middle-aged gamb.	
Mestre-Bach (2019)	Spain	A longitudinal observational study assessing the effects of CBT therapy on gambling disorder	DSM-5	'The occurrence of a gambling episode once treatment had begun'	To assess the predictive value of DSM-5 severity levels on response CBT for GD.	*****	N/A	Higher baseline scores in trait impulsivity (negative urgency; UPPS-P) significantly	N/A

(*Continued*)

Table 1. Continued.

Authors (date)	Setting	Design	Gambling disorder/ harm screener[a]	Definition of 'relapse'	Aims and objectives	Quality assessment (MMAT)	Factors influencing relapse		
							Biological	Psychological	Social
		outcomes over a 24-month follow-up period among male patients ($n = 398$) with GD.						predicted relapse during CBT treatment.	
Mestre-Bach et al. (2022)	Spain	Cohort design to analyze the clinical features and correlates of CBT outcomes focusing on sports bettors with GD ($n = 113$) compared to non-sports betting GD patients ($n = 1135$)	DSM-5	'The occurrence of a gambling episode once treatment had begun'	(1) To compare the clinical characteristics of GD patients whose primary gambling activity was sports betting with GD patients with other primary gambling activities. (2) To compare treatment outcomes between patients. (3) To explore relationships between specific variables (GD severity, psychological distress and personality features) and treatment outcome.	****	N/A	Relapse among sports bettors was significantly predicted by experiencing higher psychological distress according to the Symptom Checklist-Revised (SCL-90-R).	Relapse among sports bettors was significantly predicted by being unmarried.
Ouellet and Queloz (2018)	Canada	Retrospective design using multi-level analysis to examine the relationship between life circumstances and gambling behavior among problem gamblers ($n = 100$) over a three-year period.	PGSI (score of 8+)	N/A	To shed light on the interaction between conventional and deviant life circumstances and three indicators of gambling: amounts spent on gambling, interruptions in gambling, and relapse.	*****	(1) The likelihood of relapse was significantly higher among men compared to women.	The likelihood of relapse was significantly higher among those who reported higher expenditure on alcohol and drugs.	(1) Higher educational status, particularly having a university degree, significantly reduced the likelihood of relapse. (2) The likelihood of relapse was significantly higher among those who admitted to committed crimes.
Ramos-Grille et al. (2015)	Spain	Naturalistic follow-up design with a case-control approach, assessing treatment-seeking PGs ($n = 44$) over a 12-month period.	DSM-IV	'More than two isolated episodes of gambling during the 12-month follow-up or one episode with a loss of control quantified as a total expense higher than a week of gambling prior	(1) To assess the personality profile of treatment-seeking adult outpatients with PG compared to a matched control group. (2) To determine which personality variables would predict treatment outcome	*****	N/A	Higher scores on the impulsive-sensation seeking (ImpSS) dimension of the Zuckerman–Kuhlman Personality Questionnaire (ZKPQ) were a significant predictor of relapse among PGs.	N/A

(*Continued*)

Table 1. Continued.

Authors (date)	Setting	Design	Gambling disorder/ harm screener[a]	Definition of 'relapse'	Aims and objectives	Quality assessment (MMAT)	Factors influencing relapse		
							Biological	Psychological	Social
				to entering treatment'					
Smith et al. (2015)	Australia	Prospective cohort design that involved an initial Delphi inquiry to identify relapse predictors followed by empirical testing of those predictors in treatment-seeking PGs ($n = 158$) over a 6- to 12-month period	DSM-IV	'A return to problem gambling following a remission period'	To identify potential predictors of relapse using an expert consensus process and then based on these findings to assess the demographic, behavioral, clinical and social characteristics that may consistently predict relapse in problem gambling across time.	*****	N/A	Increased gambling urges (according to the gambling urge scale; GUS), and increased gambling cognitive distortions (according to the gambling related cognition scale; GRCS) were significant predictors of relapse.	N/A
Syvertsen et al. (2020)	Norway	In-depth qualitative interview study involving individuals ($n = 12$) with GD.	DSM-5	N/A	To understand what experiences do individuals with current or lifetime GD have with gambling-related direct marketing	*****	N/A	N/A	Gambling-related marketing had some potential to increase gambling-related urges, which were in turn likely to lead to relapse.
Syvertsen et al. (2020)	Norway	In-depth qualitative interview study involving individuals ($n = 9$) with GD.	DSM-5	N/A	To explore the experiences of gamblers within a Norwegian self-help group for gambling-related harm.	*****	N/A	Maintaining a mindset that frames gambling disorder as continuous, and something that never really goes away was a commonly reported protective factor against relapse.	Keeping regular attendance at self-help meetings for gambling was a commonly reported protective factor against relapse.
Valenciano-Mendoza et al. (2021)	Spain	Cross-sectional design assessing treatment seeking adults with GD ($n = 1112$).	DSM-5	'The occurrence of an episode of gambling activity during the psychological intervention'	(1) To identify sociodemographic and clinical factors associated with the presence of suicidal behavior in patients with GD. (2) To identify sociodemographic and clinical factors associated with the risk of dropout and relapse in the framework of a CBT intervention. (3) To	****	The risk of relapse was increased for women compared to men.	N/A	The risk of relapse was increased for unmarried patients, those reporting unemployed status, and those who reported an absence of family support.

(*Continued*)

Table 1. Continued.

Authors (date)	Setting	Design	Gambling disorder/ harm screener[a]	Definition of 'relapse'	Aims and objectives	Quality assessment (MMAT)	Factors influencing relapse		
							Biological	Psychological	Social
					assess whether suicidal behavior, gender, and gambling preference may contribute to explaining the risk of dropout and relapse during CBT.				
Vintró-Alcaraz et al. (2024)	Spain	Longitudinal comparison between patients with gambling disorder (GD) with and without self-reported ADHD symptomatology ($n = 170$)	DSM-5	'Gambling behaviour after a period of abstinence during treatment'	To explore differences between patients with GD with and without self-reported ADHD symptoms regarding psychopathology, personality, sociodemographic and treatment outcome measures.	****	N/A	Those with self-reported ADHD symptoms experienced more severe relapses than those without.	N/A
Vintró-Alcaraz et al. (2022)	Spain	A longitudinal observational study of patients with GD ($n = 171$).	DSM-IV-TR	'The occurrence of a full gambling episode once CBT had begun'	(1) To compare sociodemographic and clinical profiles among GD patients with and without gambling-related illegal acts. (2) To assess treatment outcomes of CBT (dropouts and relapses) across these groups.	*****	N/A	N/A	Patients who had committed offenses with legal consequences presented the highest risk of relapse compared to all other participants.

Note: a = The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), The Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition: Text Revision (DSM-IV-TR), The Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV), Problem Gambling Severity Index (PGSI). * = MMAT scoring out of 5.

Table 2. Summary of narrative subthemes according to the BPS model.

BPS component	Subthemes
Biological factors	Sex and age
Psychological factors	Substance use
	Personality and temperament
	Cognitive components
	Impulsivity and delayed discounting
	Psychopathological state and comorbid conditions
	Gambling severity and behaviors
Social factors	Marital status and social support
	Education, employment, and economic status
	Expenditure and debt
	Participation in crime
	Gambling advertising exposure

Psychological factors

Substance use

Alcohol and illicit drug use were risk factors for GD relapse. For example, among a sample of male patients ($n = 111$) undergoing outpatient CBT sessions for GD, Jiménez-Murcia et al. (2016) prospectively identified alcohol risk/dependency as a significant predictor of relapse ($p = .009$). By the final CBT session, 50% of patients classified as at-risk or alcohol dependent via the Alcohol Use Disorders Identification Test (AUDIT; Saunders et al. 1993) had relapsed, compared to 15% of others. This substantial difference in relapse rates corresponded to an approximate risk ratio of 3.33, suggesting at-risk/dependent drinkers were over three times more likely to relapse. Similarly, in a retrospective multi-level analysis, higher monthly expenditure on alcohol and illicit drugs was associated with a greater likelihood of relapse (OR = 1.717, 95% CI: 1.236–2.387, $p < .01$) among patients ($n = 100$) undergoing therapy for GD (Ouellet and Queloz 2018). In a prospective cohort study involving women-only samples ($n = 219$), comparable findings were produced (Baño et al. 2021), with self-reported illicit drug use being identified as a significant predictor of a higher number of relapses during CBT ($B = 0.851$, $p = .004$).

Personality and temperament

Various studies have utilized the Temperament and Character Inventory (TCI; Cloninger et al. 1994) in order to establish the personality factors associated with relapse in GD. For example, higher 'Harm Avoidance' scores on the TCI consistently predicted relapse ($p \leq .05$) in three prospective studies (Aragay et al. 2015; Granero et al. 2020; Lara-Huallipe et al. 2022). The magnitude of these associations ranged from medium to large. In Lara-Huallipe et al. (2022), pairwise comparisons between the highest-risk relapse cluster and the good-progression cluster yielded a Cohen's d of 0.71 for Harm Avoidance. In Granero et al. (2020), the poor-outcome trajectory (T3) reported a mean Harm Avoidance score of 109.3 compared to 98.2 and 93.2 for the recovery trajectories (T1 and T2), with effect sizes in the moderate range ($|d| > 0.50$). This dimension is characterized (in-part) by challenges in managing difficult situations and a fear of uncertainty. Individuals scoring high on Harm Avoidance may therefore perceive themselves as being less capable of maintaining abstinence (Aragay et al. 2015). This view is supported by Gomes and Pascual-Leone (2015), who prospectively reported abstinence self-efficacy as a significant negative predictor of GD relapse ($p < .05$) among patients ($n = 50$) two months into CBT. Relatedly, lower scores on the 'Self-Directedness' dimension of the TCI were also consistently reported as a significant predictor ($p \leq .05$) of GD relapse in three studies (Granero et al. 2020; Grall-Bronnec et al. 2021; Lara-Huallipe et al. 2022). All three studies employed prospective or longitudinal designs, strengthening the basis for interpreting Self-Directedness as a predictive factor rather than merely an associative one. This was among the largest effect sizes observed across the included studies. Lara-Huallipe et al. (2022) reported a Cohen's d of 0.96 for Self-Directedness when comparing the high-relapse cluster (C3, mean = 106.7) to the good-progression cluster (C1, mean = 124.7), representing a large effect. Granero et al. (2020) similarly found that the poor-outcome trajectory (T3, mean = 111.1) had markedly lower Self-Directedness than recovery trajectories (T1, mean = 124.5; T2, mean = 139.5), with the T2–T3 comparison reaching a large effect size. In Grall-Bronnec et al. (2021), a 5-year prospective cohort study employing a Markov model-based approach, lower Self-Directedness at a given follow-up visit predicted relapse at the subsequent visit (OR = 0.97 per unit increase, 95% CI: 0.94–0.99, $p = .047$). Although the per-unit odds ratio appears modest, the cumulative effect across the scale range is substantial. Additionally, experiencing at least one month of gambling abstinence was identified as a strong protective factor against relapse (OR = 0.24, 95% CI: 0.07–0.82, $p = .023$), indicating that those who had taken a gambling-free period were approximately four times less likely to relapse than those who had not. In this context, low self-directedness would be characteristic of patients with a poor ability to manage and adapt their behavior to fit specific goals and values, such as abstinence (Granero et al. 2020).

One study identified high scores on the 'Self-Transcendence' dimension of the TCI as a significant predictor ($p = .001$) of relapse among patients ($n = 440$) receiving CBT for GD (Jiménez-Murcia 2015). This prospective cohort study included a 3-month follow-up period. Self-forgetfulness is a key component of this dimension, where individuals may become fully immersed in a moment or particular activity, leading to reduced self-consciousness. Given that relapse-prevention often requires grounded self-awareness and conscious decision-making, high Self-Transcendence may pose a risk to GD recovery outcomes for some individuals (Jiménez-Murcia et al. 2015). Though consistent, these personality-related factors should be interpreted with caution given the considerable overlap in research settings and participant pools across these studies.

Cognitive components

The Wisconsin Card Sorting Task (WCST) has been used to measure executive functioning in relation to relapse (WCST; Berg 1948; Heaton 1981). In a prospective cohort study of male treatment-seeking patients with GD ($n = 144$), low cognitive flexibility, as indicated by higher perseverative errors on the WCST, significantly predicted ($p = .048$) relapse within six months after the final CBT session (Mallorquí-Bagué et al. 2018). Specifically, WCST perseverative errors predicted relapse at follow-up ($B = 0.128$, $p = .020$). WCST failure to maintain set also predicted time to first relapse ($B = -0.374$, $p = .048$). These errors typically reflect difficulty in adapting to changing circumstances, a trait also closely linked to compulsive behaviors, which may hinder effective responses to GD treatment strategies (Mallorquí-Bagué et al. 2018).

Similar investigations have focused on gambling-specific cognitive components. For example, Smith et al. (2015) prospectively investigated 158 patients with GD using the Gambling Related Cognitions Scale (GRCS; Raylu and Oei 2004) and found that higher GRCS scores significantly predicted relapse ($p < .05$). However, it should be noted that their analysis focused on total GRCS scores rather than examining the individual subscales. Relatedly, Mallorquí-Bagué et al. (2019) used a combined cross-sectional and longitudinal design to analyze GRCS subscales among 205 male treatment-seeking GD patients and identified two significant factors associated with relapse: higher scores in GRCS 'inability to stop gambling' ($p = .002$) and 'interpretive biases' ($p = .048$). The cross-sectional component of this study means that the baseline profile comparisons between gambling phenotypes should be interpreted as associations, though the longitudinal tracking of treatment outcomes provides some basis for predictive inference. In combination, these cognitive distortions may lead individuals to prematurely give up on recovery efforts, compounded by selectively fixating on wins rather than losses (Mallorquí-Bagué et al. 2019).

Impulsivity and delayed discounting

High self-reported trait impulsivity was commonly associated with relapse. Specifically, 'negative urgency', measured by the UPPS-P scale (Whiteside et al. 2005), consistently predicted GD relapse ($p \leq .05$) within three longitudinal studies (Mallorquí-Bagué et al. 2018; Mallorquí-Bagué et al. 2019; Mestre-Bach et al. 2019). Mallorquí-Bagué et al. (2018) reported that UPPS-P negative urgency predicted relapse at five weeks of treatment ($B = 0.140$, $p = .015$). This trait is characterized by a tendency to act rashly under emotional distress, suggesting that GD relapse may serve as a form of negative reinforcement to manage affective states (Mestre-Bach et al. 2019). Similarly, among 44 treatment seeking individuals with GD, higher scores on the impulsive-sensation seeking (ImpSS) dimension of the Zuckerman–Kuhlman Personality Questionnaire (ZKPQ; Zuckerman 2008) were identified as a significant ($p = .033$) predictor of relapse in a naturalistic follow-up design with a 12-month observation period (Ramos-Grille et al. 2015).

The research focusing on impulsive choice, measured via delayed discounting tasks, appears to be scarce. In a longitudinal observational study, Mena-Moreno et al. 2022 identified a steeper discount rate as significantly predictive ($p = .036$) of GD relapse among male patients ($n = 133$) undergoing CBT. Steeper discount rates reflect a preference for immediate rewards and a low tolerance for delayed gratification. Consequently, such tasks may be useful in identifying individuals who struggle to resist gambling urges and maintain abstinence (Mena-Moreno et al. 2022). However, further research is necessary to explore this relationship and its implications.

Psychopathological state and comorbid conditions

Numerous studies have investigated the relationship between self-reported psychopathological state and GD relapse. Across four longitudinal studies with an aggregate sample of 3189 individuals with GD, poor psychopathological state before treatment, as measured by the Symptom-Checklist-Revised (SCL-90-R; Derogatis and Savitz 1999) consistently predicted

($p \leq .002$) relapse (Granero et al. 2020; Lara-Huallipe et al. 2022; Mestre-Bach et al. 2022; Lucas et al. 2023). The effect sizes for psychopathological states were among the largest identified in this review. Lara-Huallipe et al. (2022) reported a Cohen's d of 1.07 for SCL-90R GSI between the high-relapse and good-progression clusters, rising to $d = 1.37$ for the depression subscale, both representing large-to-very-large effects. Grall-Bronnec et al. (2021) also reported that current mood disorders at a given follow-up visit were significantly associated with relapse at the subsequent visit in univariate analysis (OR = 6.61, 95% CI: 1.38–31.71, $p = .018$), though this did not remain significant in the multivariate model. Additionally, in a longitudinal comparison, one study compared CBT treatment outcomes between GD patients with ($n = 34$) and without ($n = 136$) co-occurring ADHD symptomatology (Vintró-Alcaraz et al. 2024). Although significant differences were not observed in the frequency of relapses between groups, those reporting ADHD symptoms experienced a significantly higher ($p = .038$) severity of GD relapse (more money spent) than those without (Vintró-Alcaraz et al. 2024).

Gambling severity and behaviors

The impact of gambling severity upon GD relapse has been examined in recent years (Lara-Huallipe et al. 2022; Lucas et al. 2023). Gambling severity is characterized by the intensity of gambling behaviors and the negative outcomes experienced as a consequence. Overall, in longitudinal designs, a higher number of DSM-5 criteria for GD (Lara-Huallipe et al. 2022) and higher scores on the South Oaks Gambling Screen (SOGS; Lesieur and Blume 1987) reported prior to treatment were identified as consistent predictors ($p \leq .05$) of relapse (Lucas et al. 2023). Lara-Huallipe et al. (2022) reported a large effect size (Cohen's $d = 0.90$) for DSM-5 criteria when comparing the high-relapse cluster (C3) to the low-severity cluster (C2). Relatedly, a preference for non-strategic forms of gambling (such as slot machines) also significantly predicted ($p = .036$) relapse among a sample of women ($n = 214$) undergoing CBT for GD in a prospective cohort design (Baño et al. 2021).

Social factors

Marital status and social support

Across an aggregate sample of 2523 participants with GD, being single (Aragay et al. 2015), unmarried (Valenciano-Mendoza et al. 2021; Mestre-Bach et al. 2022), or divorced (Baño et al. 2021) were significantly associated with relapse in each study (Lara-Huallipe et al. 2022). It should be noted that while the prospective cohort studies (Aragay et al. 2015; Baño et al. 2021; Lara-Huallipe et al. 2022) support a predictive interpretation, the cross-sectional design of Valenciano-Mendoza et al. (2021) limits their findings to an associative relationship. Lara-Huallipe et al. (2022) reported a medium effect size for marital status (Cohen's $d = 0.51$ for the married/couple comparison between the good-progression and high-relapse clusters). Baño et al. (2021) found that being divorced (compared to married) significantly predicted a higher number of relapses ($B = -0.714$, $p = .001$) in negative binomial regression. Consequently, it appears as though having a partner to rely on may lead to better treatment outcomes among those with GD (Baño et al. 2021). This assertion is supported by qualitative inquiry into the coping strategies of treatment-seeking patients with GD and their spouses. Specifically, in-depth interviews have suggested that positive reinforcement of sobriety behaviors from one's spouse or partner (such as encouragement and congratulations) helps to prevent relapse (Côté et al. 2020). However, prospective cohort studies addressing spousal support during GD treatment have produced mixed findings. Among a sample of 440 patients receiving CBT for GD, Jiménez-Murcia et al. (2015) prospectively identified that the involvement of a spouse who focused purely on the monitoring of symptoms significantly predicted ($p = .029$) relapse. In contrast, Jiménez-Murcia et al. (2017) observed that when a spouse actively participated in the treatment process, offering both emotional support and environmental supervision, the likelihood of relapse decreased significantly ($p < .001$).

Research also suggests that family support can protect individuals with GD. Qualitative interviews show that positive family activities provide natural rewards and help redirect attention, preventing relapse (Côté et al. 2020). Correspondingly, in a cross-sectional study of 1112 individuals seeking GD treatment, lack of family support was significantly associated with relapse ($p = .003$; Valenciano-Mendoza et al. 2021). However, the effect size for this association was small (Cramer's $V = 0.088$). As this was a cross-sectional design, causal or predictive inferences cannot be drawn from this finding alone, though it is consistent with findings from prospective studies (e.g. Jiménez-Murcia et al. 2017) that have demonstrated the protective role of social support. It appears as though broader social support can also be

a valuable tool for relapse prevention. Individuals with GD have qualitatively reported that keeping regular attendance at self-help meetings was beneficial to their recovery in numerous ways (Syvertsen et al. 2020). For example, experienced members described how helping newer attendees was rewarding and effective for relapse prevention. Other participants reported how hearing about others' progress helped to reduce gambling urges and was therefore an important component of relapse prevention (Syvertsen et al. 2020).

Education, employment and economic status

Across an aggregate sample of 446 participants with GD, lower educational attainment consistently predicted ($p \leq .05$) relapse in three prospective studies (Echeburúa et al. 2017; Granero et al. 2020; Baño et al. 2021). Baño et al. (2021) reported an odds ratio of 0.449 (95% CI: 0.234–0.863, $p = .016$) for secondary versus primary education in predicting relapse, indicating that women with secondary education were less than half as likely to relapse compared to those with primary education only. A corresponding 3-year retrospective study also indicated that higher educational attainment significantly ($p < .05$) reduced the risk of relapse among 100 individuals experiencing disordered gambling (Ouellet and Queloz 2018). Specifically, each increment in educational level reduced the odds of relapse by approximately 20% (OR = 0.802, 95% CI: 0.660–0.974, $p < .05$), with university-educated participants approximately five times less likely to relapse than those without a high school diploma. This fivefold reduction in relapse risk represents one of the largest effect sizes identified across all included studies. Similar results have been reported in relation to employment status, whereby being unemployed was associated with relapse in a cross-sectional design (Valenciano-Mendoza et al. 2021) and 'not actively working' predicted relapse in a longitudinal investigation (Lara-Huallipe et al. 2022). Lara-Huallipe et al. (2022) reported a medium effect size (Cohen's $d = 0.52$) for employment status between the good-progression and high-relapse clusters. Relatedly, lower economic status was identified as a significant predictor ($p < .05$) of relapse among those ($n = 192$) undergoing CBT for GD in a longitudinal study (Granero et al. 2020). In combination, lower educational levels, lower economic status, and unemployment are often correlated with financial stress and reduced access to support systems, which may make it more challenging for individuals to maintain recovery and resist gambling urges (Granero et al. 2020; Baño et al. 2021). These results, however, warrant cautious interpretation due to the substantial overlap in research contexts and the likely shared participant pools.

Expenditure and debt

Two prospective studies with an aggregate sample of 601 GD patients consistently identified lower-level pretreatment expenditure on gambling (less than €100 per week) as a predictor ($p < .05$) of relapse (Aragay et al. 2015; Echeburúa et al. 2017). These individuals may tend to minimize the harmful effects of gambling smaller amounts of money. Whether this expenditure was accompanied by a perceived lack of control was not explored in either study (Aragay et al. 2015; Echeburúa et al. 2017). Similarly, the lowest amount of self-reported debt (Lara-Huallipe et al. 2022), or an absence of gambling-related debt (Baño et al. 2021) consistently predicted ($p < .05$) relapse in two longitudinal studies. Baño et al. (2021) reported an odds ratio of 0.589 (95% CI: 0.326–0.999, $p = .048$) for gambling-related debts as a predictor of relapse, indicating that the presence of debts was associated with approximately 41% lower odds of relapse during treatment. Grall-Bronnec et al. (2021) also identified monthly gambling expenditure as a significant univariate predictor of relapse (OR = 1.002 per euro increase, 95% CI: 1.000–1.003, $p = .012$), though this was not retained in the final multivariate model. It is possible that without significant financial consequences, these individuals may not have experienced enough negative outcomes to motivate long-term behavior change (Baño et al. 2021).

Participation in crime

Research has demonstrated a link between gambling-related criminal activity and increased relapse rates across an aggregate sample of 271 GD patients. This association was observed within both a retrospective multi-level study (Ouellet and Queloz 2018) and a longitudinal observational study (Vintró-Alcaraz et al. 2022), and may be particularly pronounced for individuals with more serious criminal histories. Ouellet and Queloz (2018) reported that participants were over 11 times more likely to relapse in months in which they committed lucrative crimes (OR = 11.068, 95% CI: 3.854–17.789, $p < .01$), representing the single largest effect size for any dynamic factor associated with relapse identified in this review. The retrospective within-person design of this study captures temporal co-occurrence of crime and relapse within individuals' trajectories, providing stronger evidence

than cross-sectional associations, though it does not establish strict temporal precedence in the manner of a prospective design. GD patients who reported committing crimes that resulted in legal consequences demonstrated a higher likelihood of relapse compared to two other groups: those who reported no criminal history and those who disclosed past criminal activity without legal repercussions (Vintró-Alcaraz et al. 2022). While the DSM-IV included committing illegal acts to fund gambling as a criterion for 'pathological gambling', this was removed in the DSM-5 due to its lower prevalence and reduced clinical relevance for GD. As a result, individuals who report engaging in criminal activity to support their gambling may represent a subgroup who experience a greater severity of the disorder, which could explain a heightened risk of relapse (Ouellet and Queloz 2018; Vintró-Alcaraz et al. 2022).

Gambling advertising exposure

Assessing the behavioral effects of gambling advertising through experimental methods presents significant challenges. As a result, the current evidence regarding its impact on GD relapse derives from in-depth qualitative interviews. Notwithstanding the self-reporting biases associated with this approach, some valuable insights have emerged. For example, Spanish sports bettors ($n = 43$) diagnosed with GD have reported experiencing 'advert-induced relapse' (Lopez-Gonzalez et al. 2020). This phenomenon appeared to be triggered especially by financial incentives (such as 'free' bets) as well as direct marketing campaigns, causing significant anxiety and frustration among participants (Lopez-Gonzalez et al. 2020). Comparable accounts have also been provided by Norwegian individuals ($n = 12$) with GD (Syvertsen et al. 2020). Gambling advertisements were generally viewed as urge-inducing, and therefore facilitative of relapse (Syvertsen et al. 2020). However, some participants reporting long-term abstinence expressed that gambling advertising had lost its significance and therefore had little to no effect upon their behavior. Given that this evidence is exclusively qualitative, it provides insights into perceived mechanisms linking advertising and relapse but cannot establish predictive or causal relationships.

Discussion

This systematic review synthesized recent empirical evidence on the factors that influence relapse in GD. Our findings reveal a robust body of evidence underscoring the role of psychological and social factors, which appear more firmly established than biological factors. The majority of this evidence was derived from prospective cohort designs ($n = 17$ of 21 quantitative studies), supporting predictive interpretations for most identified factors, though a smaller number of cross-sectional studies contributed associative findings. These findings align with the BPS model adapted for GD (Sharpe 2002), which conceptualizes GD as multiply determined through the dynamic interaction of biological, psychological, and social factors. The predominance of psychological factors (e.g. cognitive distortions, personality traits) and social determinants (e.g. support networks, economic factors) identified in this review is consistent with Sharpe's emphasis on these domains in maintaining gambling behavior. However, this should not be interpreted as evidence that biological factors exert less influence on GD relapse overall. Rather, it may reflect the inherent challenges of investigating biological mechanisms within this relatively narrow research field. Another key finding related to the homogeneity of the evidence base, whereby the majority of studies originated from Spain and often drew from the same sample.

From a clinical perspective, our findings suggest several potential refinements to current GD treatment and relapse prevention protocols. First, comprehensive assessment of relapse risk factors should be conducted before treatment initiation, including personality dimensions (particularly harm avoidance and self-directedness), cognitive flexibility, impulsivity traits, and psychopathological state (Aragay et al. 2015; Mallorquí-Bagué et al. 2018; Mestre-Bach et al. 2019; Grall-Bronnec et al. 2021). The consistent finding across multiple prospective studies that poor psychopathological state predicts relapse (with effect sizes ranging from $d = 1.07$ to 1.37) indicates that addressing comorbid conditions may be crucial for successful outcomes (Granero et al. 2020; Lara-Huallipe et al. 2022; Mestre-Bach et al. 2022; Lucas et al. 2023). This is particularly pertinent for substance use comorbidities, given that alcohol risk/dependency and illicit drug use predicted relapse across multiple prospective and retrospective studies, with at-risk/dependent drinkers over three times more likely to relapse (Jiménez-Murcia et al. 2016; Ouellet and Queloz 2018; Baño et al. 2021). Screening for substance use at treatment intake and integrating concurrent substance use interventions may therefore be essential for optimizing relapse prevention outcomes in at-risk patients. Second, treatment approaches may benefit from

personalization based on identified risk factors. For instance, patients reporting high harm avoidance might require additional skills training in uncertainty tolerance (Zhou et al. 2022), while those with cognitive inflexibility may benefit from specific cognitive remediation approaches (Challet-Bouju et al. 2017).

The social determinants of relapse identified in this review underscore the value of incorporating social intervention strategies into treatment approaches. Assessment of patients' marital status, social support networks, educational level, employment status, and economic situation appears warranted, given that these factors consistently predicted or were associated with relapse outcomes across multiple studies of varying designs (Jiménez-Murcia et al. 2017; Côté et al. 2020; Valenciano-Mendoza et al. 2021). Treatment programs might benefit from integrating family therapy components when appropriate, though it's worth noting that the needs of affected others will likely differ from those of the GD patients themselves (Merkouris et al. 2022). For patients without available family support systems, recommending mutual-aid and self-help groups as complementary resources to psychotherapy may provide valuable alternatives (Hutchison et al. 2018). Interestingly, the finding from prospective studies that lower weekly gambling expenditure and absence of gambling-related debt predicted relapse (OR = 0.59 for the presence of debts; Baño et al. 2021) suggests the importance of careful attention to patients who may minimize their gambling issues (Aragay et al. 2015; Echeburúa et al. 2017; Baño et al. 2021). This finding may appear paradoxical given that higher gambling severity also predicted relapse across studies (Lara-Huallipe et al. 2022; Lucas et al. 2023). However, these seemingly contradictory findings may be reconciled by recognizing that severity is multidimensional. The measures employed (DSM-5 criteria and SOGS scores) capture loss of control, preoccupation, and psychological distress rather than financial consequences exclusively. Thus, high severity can coexist with modest expenditure (Medeiros et al. 2018), while minimal financial consequences may reduce motivation for sustained change, representing distinct pathways to relapse. For such individuals, motivational enhancement techniques may help foster awareness of non-financial harms and strengthen commitment to change (Keshani et al. 2025).

Given the qualitative evidence on marketing exposure (Lopez-Gonzalez et al. 2020; Syvertsen et al. 2020), relapse prevention plans may benefit from media literacy training or counter-advertising interventions (Torrance et al. 2025). These interventions may be especially necessary given that 'safer gambling' adverts aimed to reduce harm have been shown to increase both urges to gamble and perceived stigma (Newall et al. 2025; Palmer et al. 2025). However, as is the case within the gambling advertising literature in general, more experimental research on gambling advertising impact is needed (Newall et al. 2024). Finally, the association between criminal activity and increased relapse rates (Ouellet and Queloz 2018; Vintró-Alcaraz et al. 2022) suggests that patients with gambling-related legal issues may represent a high-risk subgroup requiring more intensive interventions.

In relation to the completeness and applicability of the literature, definitions of GD relapse were inconsistent and in many cases absent, which may cause several issues in interpreting our synthesized findings here. For example, many of the included studies classified any level of engagement in gambling as a relapse, an approach that may oversimplify the nuanced reality of recovery and inflate estimates of 'full' or 'true' relapse rates. Recovery is not a one-size-fits-all process, and complete abstinence from gambling may not be a realistic or necessary goal for some individuals (Ladouceur et al. 2009). Instead, emphasizing reductions in gambling behavior can offer a more practical and effective path forward which may still lead to meaningful progress (Mena-Moreno et al. 2022). This approach also aligns with public health frameworks that prioritize minimization of population-based risk, potentially yielding greater collective benefits than a sole focus on abstinence (Blaszczynski et al. 2004; Blank et al. 2021). Brief and innocuous returns to gambling ('lapses') may therefore not always equate to a full relapse for those with GD (Ramos-Grille et al. 2015), yet this critical distinction was often unclear across studies. This lack of clarity underscores the need for explicit and consistent terminology across the gambling literature to better capture the spectrum of relapse, lapses, and their implications for personalized treatment goals (Mansueto et al. 2024). While the inconsistency in defining relapse presents a challenge in coherently integrating the literature, it is not the only limitation observed in the current body of research.

Compared to adjacent areas such as the AUD literature (Sliedrecht et al. 2019, 2021, 2022), it appears the amount of available evidence on GD relapse is sufficient but not comprehensive in addressing the aims of this review. For example, a number of influential BPS factors were supported by only one study

(e.g. age or ADHD symptomatology). This scarcity of replicated findings poses challenges in conducting comprehensive approaches such as meta-analyses. As mentioned throughout, there also appears to be a high amount of cultural homogeneity across the included literature. A total of 19 studies (74% of those included) were conducted in Spain, with most of these originating from one particular medical facility, and many participants derived from the same sample group (Granero et al. 2020; Baño et al. 2021; Valenciano-Mendoza et al. 2021; Lara-Huallipe et al. 2022; Mestre-Bach et al. 2022; Vintró-Alcaraz et al. 2024). Studies on GD relapse from the UK (Seel et al. 2024) and the United States (Pfund et al. 2023) are lacking. This gap is particularly problematic given that each jurisdiction's gambling environment possesses unique characteristics and associated risks (Raylu and Oei 2004; Medeiros et al. 2015). Despite the studies being distinct, a broader overreliance upon predominantly Spanish data may therefore limit our ability to draw comprehensive conclusions about GD relapse. To develop a more nuanced and globally applicable understanding of GD relapse, we deem it a priority to expand research efforts to include a wider range of cultural and regulatory contexts.

A related limitation concerns the extent to which the included evidence reflects the contemporary gambling landscape. One justification for this review was the need to capture recent developments in gambling practices and their potential impact on relapse. However, most included studies focused on traditional or land-based gambling populations, with the majority of Spanish samples drawn from patients attending a single face-to-face treatment facility. Emerging forms of gambling-like engagement, such as speculative financial trading (Mosenhauer et al. 2021; Newall and Weiss-Cohen 2022; Lee et al. 2023) and the convergence of gaming and gambling through mechanisms like loot boxes (Grall-Bronnec et al. 2017), were not addressed in any of the included studies. This is a notable gap given the increasing blurring of boundaries between gambling, gaming, and financial speculation, each of which may involve distinct relapse dynamics. What did emerge as a distinguishing feature of more recent research was the role of gambling advertising as a relapse precipitant (Lopez-Gonzalez et al. 2020; Syvertsen et al. 2020), a factor largely absent from earlier reviews of GD relapse (Ledgerwood and Petry 2006). The identification of advertising exposure as a contributor to relapse is significant because it shifts attention beyond individual-level risk factors toward commercial and environmental determinants (Wardle et al. 2024). This aligns with broader calls to consider the structural and commercial drivers of gambling harm at a population level (Newall et al. 2024). Nevertheless, the lack of evidence on relapse in the context of online gambling, mobile betting, and gambling-adjacent activities represents a substantial blind spot in the current literature, and future research should prioritize these increasingly prevalent modes of gambling engagement.

While the BPS model provided a useful organizing framework for this review, it is not the only theoretical lens through which our findings can be interpreted. Most notably, the Pathways Model (Blaszczynski and Nower 2002) is the most prominent etiological model of GD and proposes three distinct developmental trajectories: behaviorally conditioned, emotionally vulnerable, and antisocial-impulsivist (Nower et al. 2022). Several of our findings map onto these pathways. The role of cognitive distortions and gambling severity aligns with the conditioning mechanisms described in pathway 1, whereas the influence of comorbid psychopathology, negative urgency, and harm avoidance is consistent with the emotional vulnerability characterizing pathway 2. Similarly, the associations between impulsivity, criminal activity, and relapse correspond with the antisocial-impulsivist profile of pathway 3 (Billieux et al. 2022; Bonnaire et al. 2022). More recently, the Interaction of Person-Affect-Cognition-Execution (I-PACE) model (Brand et al. 2016, 2019, 2025) has been proposed as a process model of addictive behaviors, including GD. The I-PACE model emphasizes the dynamic interplay between predisposing characteristics, affective and cognitive responses to situational triggers, and diminished executive control. This framework is particularly relevant given the increasing migration of gambling to online environments, where personalized digital platforms, continuous accessibility, and algorithmically tailored inducements may intensify cue-reactivity and habitual engagement (Ghelfi et al. 2024). Our findings on impulsivity, delayed discounting, and psychopathological state as relapse predictors are broadly consistent with the mechanisms described within the I-PACE model. However, no studies in our review explicitly tested these process-based models in relation to GD relapse, highlighting a gap that future research should address. Integrating etiological and process-based frameworks with the BPS perspective adopted here may offer a more granular understanding of how and why relapse occurs across different subgroups of individuals with GD.

Another notable pattern emerged across the included literature in that all studies examining treatment-seeking samples exclusively involved participants receiving CBT or CBT-based interventions. While CBT is currently the primary evidence-based treatment for GD, its long-term efficacy remains limited (Pfund et al. 2023). This predominance of CBT in the relapse literature presents both strengths and limitations for our synthesis. On one hand, the homogeneity in treatment approach provides consistency when examining relapse predictors. On the other hand, it significantly constrains our understanding of relapse beyond this single therapeutic modality. The gambling treatment landscape is evolving, with growing interest in pharmacological interventions (Kraus et al. 2020; Ioannidis et al. 2025) and brief interventions (Forman et al. 2025; Kapukotuwa et al. 2025; Smith et al. 2025). Yet research examining relapse factors in the context of these alternative treatments remains virtually absent. To develop a comprehensive and treatment-agnostic understanding of GD relapse, future research must extend beyond CBT to investigate whether the risk and protective factors identified here generalize across different therapeutic approaches, or whether treatment-specific predictors exist.

Limitations

This review has several limitations. First, given the variation in methods, measures, and sample characteristics of the included literature, we were unable to conduct a rigorous quality assessment of each study. Second, and relatedly, this variation prevented us from performing a statistical analysis (e.g. a meta-analysis or meta-regression) of the associated findings. However, we instead provided an in-depth narrative synthesis that was framed by the integrative framework of the BPS model, which represents a distinctive strength of this review. Third, we acknowledge the potential of a language bias by limiting our search to studies written in English exclusively. Therefore, pertinent records written in other languages may have been omitted during this process. Fourth, we restricted our search to peer-reviewed publications, excluding grey literature and conference proceedings. This approach ensured that all included studies had undergone rigorous peer review and provided sufficient methodological detail for quality appraisal. However, this represents a limitation, as it may have excluded relevant unpublished studies or introduced publication bias if positive findings were preferentially published in peer-reviewed outlets. Fifth, we did not consult a librarian in optimizing our search strategy, which is considered best practice for systematic reviews and therefore may have affected search comprehensiveness and efficiency. Despite these limitations, we employed numerous coders to reinforce the rigor of the screening and synthesis processes, and preregistered the protocol to increase transparency and trustworthiness.

Conclusions

A broad set of BPS factors appear to influence GD relapse and are therefore likely to be variable and context specific. While some factors such as impulsivity and social support are strongly evidenced, other factors such as sex, participation in crime, and exposure to gambling advertising warrant further investigation. Overall, the emergent literature in this field is marked by significant cultural homogeneity and inconsistent terminology; a broader cultural scope and unified lexicon is warranted for future research. It is important for investigations into this topic to develop in order to better understand long-term recovery outcomes in GD and to appropriately inform clinical practice.

Author contributions

CRediT: **Jamie Torrance**: Conceptualization, Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing; **Martyn Quigley**: Validation, Writing – review & editing; **Conor Heath**: Validation, Writing – review & editing; **Alecia Cousins**: Validation, Writing – review & editing; **Glen Dighton**: Validation, Writing – review & editing; **Simon Wright**: Validation, Writing – review & editing; **Simon Dymond**: Writing – review & editing; **Philip Newall**: Project administration, Writing – review & editing.

Consent form

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