Interventions, Approaches and Guidelines for Gambling and Gaming Addictions: An Evidence Review

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Abbreviations

ABM	Approach Bias Modification
ACRIP	Acceptance and Cognitive Restructuring Intervention Program
AD	Antidepressant
ADHD	Attention Deficit Hyperactivity Disorder
AGREE II	Appraisal of Guidelines for Research & Evaluation
AMSTAR 2	A Measurement Tool to Assess Systematic Reviews: Revised
ATM	Atomoxetine
BA	Brief Advice
BDI-II	Beck Depression Inventory-II
BP	Brief Psychoeducation
BT	Behavioural Therapy
CB	Cognitive Behavioural
CBI	Craving Behavioural Intervention
CBM	Cognitive Bias Modification
CBGT	Cognitive Behavioural Group Therapy
CBI	Cognitive Behavioural Intervention
CBT	Cognitive Behavioural Therapy
CCT	Congruence Couple Therapy
CEQ	Credibility/Expectancy Questionnaire
CG	Control Group
CHO	Community Health Organisation
CONSORT	Consolidated Standards of Reporting Trails
CT	Cognitive Therapy
CWEP	Cyber Wellness Enrichment Programme
CYG	Check Your Gambling
DARE	Database of Abstracts of Reviews of Effects
DBT	Dialectical Behaviour Therapy
DCU	Dublin City University
DSM	Diagnostic and Statistical Manual of Mental Disorders
EABM	Emotional Association Bias Modification
EDU	Education
EG	Experimental Group
EGM	Electronic Gaming Machine
EMA	Ecological Momentary Assessment

EMI	Ecological Momentary Intervention
ESRI	Economic and Social Research Institute
ET	Exposure Therapy
FT	Family Therapy
FTFT	Face-to-Face Treatment
GA	Gamblers Anonymous
GAS	Game Addiction Scale
GD	Gambling Disorder
G-SAS	Gambling Symptom Assessment Scale
IBI	Internet-Based Intervention
ICBT	Internet-Based Cognitive Behavioural Therapy
ICD	International Classification of Diseases
IGD	Internet Gaming Disorder
JBI	Joanna Briggs Institute
LGBTQ	Lesbian, Gay, Bisexual, Transgender, Queer/Questioning
MA	Meta-Analysis
MBI	Mindfulness-Based Intervention
MCT	Metacognitive Training
MDD	Major Depressive Disorder
MDFT	Multidimensional Family Therapy
MeSH	Medical Subject Headings
MET	Motivational Enhancement Therapy
MFGT	Multi-Family Group Therapy
MFS	Mindfulness-Based Family Therapy
MI	Motivational Interviewing
MMT	Methadone Maintenance Therapy
MORE	Mindfulness-Oriented Recovery Enhancement
MPH	Methylphenidate
MST	Mood Stabiliser
NDRI	Norepinephrine and Dopamine Reuptake Inhibitor
NHS	National Health Service
NiBS	Non-Invasive Brain Stimulation
NR	Not Recorded
NRGP	National Responsible Gambling Programme
NTC	Non-Treatment Control
OA	Opioid Antagonist
OCD	Obsessive Control Disorder
OR	Odds Ratio
PE	Physical Exercise
PFI	Personalised Feedback Intervention

PG	Problem Gambling
PGSI	Problem Gambling Severity Index
PHE	Public Health England
PICO	Population, Intervention, Comparison, Outcome
PM	Parent Management
PNFB	Personalised Normative Feedback
PPC	Pre-Post Comparison
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PTSD	Post-Traumatic Stress Disorder
RC	Residential Camp
RCT	Randomised Control Trial
RoB	Risk of Bias
RP	Relapse Prevention
SBIRT	Screening, Brief Intervention, and Referral to Treatment
SC	Supportive Counselling
SCI-GD	Structured Clinical Interview for Gambling Disorder
SCT	Self-Change Tool
SD	Standard Deviation
SDiC	Self-Discovery Camp
SGPP	Single-Group Pre-Post Test
SGTS	Statewide Gambling Therapy Service
SMC	Standardised Mean Change
SMD	Standardised Mean Difference
SOGS	South Oaks Gambling Screen
SS	Seeking Safety
SSRI	Selective Serotonin Reuptake Inhibitor
TAU	Treatment as Usual
TCC	Treatment Control Comparison
tDCS	Transcranial Direct-Current Stimulation
TPB	Theory of Planned Behaviour
TSF	12-Step Facilitation
VRT	Virtual Reality Therapy
WB	Workbook
WLC	Wait List Control

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Executive summary

Purpose

This report consolidates evidence on effective interventions, approaches and guidelines for addressing gambling and gaming addictions. It emphasises pharmacological and psychological treatments, particularly for individuals with comorbid mental health conditions, other addictions, and those from marginalised groups. The findings aim to support and inform the HSE National Social Inclusion Office, Addiction Services, in developing appropriate, evidence-based strategies for treating gambling and gaming addictions in Ireland.

Review questions

- Question 1: What international and national guidelines are available with recommendations for the management and treatment of gambling and gaming addictions?
- Question 2: What interventions are effective in managing and treating gambling and gaming addictions?
- Question 3: How are these effective interventions evaluated in terms of service users' and service providers' satisfaction?
- Question 4: Do the interventions identified take into consideration the following:
    - service users with comorbid mental health problems?
    - other addictions, and
    - the needs of marginalised groups?
- Question 5: What are the facilitators or barriers identified in the literature to implementing these effective interventions?
- Question 6: How cost-effective are these interventions?

Methods

To achieve the objectives of this review, a multi-step approach was employed. Two umbrella reviews (or reviews/overviews of reviews) were conducted. The first synthesised the evidence on effective interventions for **gambling addiction**. The second focused on effective interventions for **gaming addiction**. The findings from both umbrella reviews informed a narrative synthesis of evaluation studies that focused on the effective interventions identified.

The websites of key organisations, nationally and internationally, were also searched for additional grey/unpublished literature, as were international guidelines, including those of the World Health Organization (WHO), the Substance Abuse and Mental Health Services Administration (the US Department of Health and Human Services), the Royal Australian College of General Practitioners (behavioural addictions), the Canadian Centre on Substance Use and Addiction, the Ministry of Health Singapore, the Ministry of Health of the People's Republic of China, the International Center for Responsible Gaming, Public Health England (PHE), the National Institute for Health and Care Excellence (NICE) and the Health Service Executive (HSE). These were identified based on an examination of the organisational affiliations of key authors, as noted in key papers and reviews, and based on Internet searches. The recommendations from these guidelines were presented in tabular format.

Screening

An initial search was performed using the following electronic databases: Ovid MEDLINE, Ovid EMBASE, Ovid PsycINFO, EBSCO CINAHL Complete, Scopus, the Cochrane Database of Systematic Reviews, and the Database of Abstracts of Reviews of Effects (DARE). Records identified in the search were imported to a Zotero library (a reference management software package) and duplicates removed. These records were then imported to Covidence (a software package for managing systematic reviews) and any additional duplicates were removed. All results were screened independently by title and abstract, and then by full text, by at least two reviewers. Any conflicts were resolved by discussion, with reference to a third reviewer where needed.

Due to the scope of this evidence review, multiple tags (or labels) were assigned to the primary studies identified in Covidence for the full-text review. These tags/labels allowed the review team to filter and screen the primary literature to meet each objective.

These tags were:

- a systematic review and meta-analysis on interventions for gambling addiction;
- a systematic review and meta-analysis on interventions for gaming addiction;
- a systematic reviews and meta-analyses on addiction interventions;
- evaluation studies (barriers/facilitators/feasibility) on interventions for gambling addiction;
- evaluation studies (barriers/facilitators/feasibility) on interventions for gaming addiction;
- cost-effectiveness studies on interventions for treating gambling or gaming addiction; and
- intervention studies on effective interventions for treating gambling or gaming addiction among marginalised groups or those with other addictions and/or comorbid mental health conditions.

Data extraction

An adapted version of the Joanna Briggs Institute (JBI) data extraction form was used. The data extracted included reference details, search dates, the date ranges of included primary studies, the study design of the included studies, the population group, the intervention description and type (method of delivery, duration and regime, if available), the comparator, the description of outcomes assessed (primary and secondary), the results by each outcome, and the overall quality of the review.

Quality assessment

The quality assessment was undertaken in two stages. The AMSTAR 2 tool was used to assess the quality of the included systematic reviews (Shea et al., 2017). The methodological quality of the included systematic reviews was scored as high, moderate, low, or critically low. We included low-quality and critically low-quality reviews to highlight the methodological issues within the evidence base. The low methodological quality was exacerbated by low-quality primary research that makes up the body of evidence on interventions for treating both gambling and gaming addictions.

The second stage involved assessing the quality of the included guidelines using the Appraisal of Guidelines for Research & Evaluation (AGREE II) tool. For each domain, a combined score of >70% was deemed high quality and included in this evidence review.

Synthesis

The primary studies within the systematic reviews varied significantly in diagnostic methods, employing different criteria for screening gambling and gaming addictions. Variations were also observed in the types of psychological interventions used, particularly cognitive behavioural therapy (CBT), and in the definition of primary outcome measures. Due to inconsistencies in definitions, diagnostic methods and intervention strategies, the evidence was synthesised by intervention type and presented both narratively and in tabular format.

The data from international guidelines was also presented in tabular format and narratively synthesised. Additionally, findings from evaluation and primary studies assessing the effectiveness of interventions for treating gambling and gaming addictions were narratively synthesised, with a focus on treating individuals with co-occurring mental health conditions, other addictions and marginalised groups, as well as cost-effectiveness studies.

Findings

Search results

- Two international guidelines were included for the treatment and management of gambling addiction. No guidelines were identified for the treatment and management of gaming addiction.
- Eighteen systematic reviews and meta-analyses were narratively synthesised on effective interventions for treating **gambling** addiction. Of these, five assessed the effectiveness of pharmacological interventions, and 13 assessed the effectiveness of psychological interventions. Only one review was graded as having a high methodological quality, six rated as having a low methodological quality, and eleven rated as having a critically low methodological quality.
- Nine systematic reviews and meta-analyses on effective interventions for treating **gaming** addiction were included. Of these, five reviews assessed the effectiveness of combined psychological and pharmacological interventions, two assessed the effectiveness of psychological interventions only, one assessed the effectiveness of pharmacological interventions only, and one assessed the effectiveness of CBT only. One review was rated as having a high methodological quality, one as having a moderate methodological quality, two as having a low methodological quality, and five as having critically low methodological quality.
- Thirty-seven primary studies evaluated interventions for treating gambling addiction, and eleven evaluated interventions for treating gaming addiction.
- Thirty primary studies evaluated the effectiveness of interventions in treating gambling or gaming addiction in individuals with comorbid mental health conditions, other addictions, and marginalised backgrounds.
- Only two studies that evaluated the cost-effectiveness of these interventions for treating gambling addiction were identified. No cost-effectiveness studies were found for treating gaming addiction.

International guidelines and recommendations for treating gambling or gaming addiction: findings

- Two international guidelines – one from Australia (2011), and a more recent **draft** guideline from the UK (2024) – on the treatment and management of gambling addiction were included in the synthesis. No guidelines were found for treating and managing gaming addiction.
- The UK draft guideline emphasises the importance of using current, up-to-date validated screening tools, such as the South Oaks Gambling Screen (SOGS) or the Problem Gambling Severity Index (PGSI). The Australian guideline suggests using various screening tools, based on expert consensus (Table 3).
- Both guidelines recommend screening for gambling disorder in individuals with high-risk mental health conditions (such as those undergoing mental health assessments or treatments), reinforcing the growing recognition of the link between gambling addiction and co-occurring mental health issues.

- Both guidelines support the use of psychological interventions, particularly CBT or motivational interviewing (MI), as first-line treatments for treating gambling addiction. Pharmacological interventions, such as naltrexone, are also recommended if psychological interventions are ineffective, or in cases of repeated relapse.

Effective interventions for the treatment of gambling addiction: An umbrella review

- Five systematic reviews evaluated the effectiveness of pharmacological interventions for treating gambling addiction. The primary studies within these reviews examined various categories of medications, such as antidepressants, opioid antagonists, mood stabilisers, anticonvulsants (topiramates), and atypical antipsychotics.
- Although the reviews indicate generally positive effects of pharmacological treatments for gambling addiction, the overall conclusions of the reviews were mixed. Opioid antagonists (nalmefene, naltrexone) showed preliminary support, while conflicting results were reported for olanzapine, an atypical antipsychotic. Of the five included reviews, only one review was rated as being of high quality.
- Thirteen systematic reviews evaluated psychological interventions. Although various psychological interventions (single or combined) were evaluated, most interventions were based on CBT and MI. Other psychological interventions evaluated included brief interventions, personalised feedback interventions (PFIs), self-help, mutual support, and Internet-delivered therapies.
- CBT alone, or in combination with MI, appeared to be a promising intervention in treating gambling severity and symptoms. However, the systematic reviews varied in the mode of delivery, the length of treatment sessions, the treatment duration, and the components of the CBT delivered.

Treatment of gambling addiction for individuals with comorbid mental health conditions, other addictions, and those from marginalised groups

- CBT emerged as the most widely studied and effective intervention for treating patients with gambling addiction and co-occurring anxiety, depression, schizophrenia, post-traumatic stress disorder (PTSD) and suicidal ideation. Additionally, the intervention Seeking Safety was found to be effective for patients with PTSD. Outcome and relapse rates were influenced by several variables, including patients' experiences of other mental health conditions and demographic variables.
- Although results from a meta-analysis on pharmacological interventions (Dowling et al., 2022) revealed mixed results on the reduction of depressive and anxiety symptoms in patients with gambling addiction, according to the review authors, the findings relating to the use of antidepressants versus placebos should be interpreted cautiously. The individual trials were small and supported only a modest pooled sample of participants. As such, this comparison may have lacked the power to detect modest effects of the pharmacological intervention(s). There was significant heterogeneity among the included studies in relation to study designs, intervention characteristics, and screening and diagnostic tools, and this limits the ability to draw definite conclusions.

- Among the studies evaluating treatments for gambling addiction in patients with other addictions, various interventions specifically targeting both gambling and alcohol addiction were evaluated. These studies also exhibited differences in study design and outcome measures, with small sample sizes. The interventions evaluated included congruence couple therapy (CCT), brief personalised feedback, CBT, naltrexone combined with CBT, and MI.
  - MI was found to be effective in one study, but the small sample size limits its generalisability. No significant differences were observed in group therapy. One study evaluating the combination of naltrexone and CBT showed significant short-term improvements, although these benefits had not been sustained by the time of the one-year follow-up.
  - CCT was the only intervention reported to be effective in reducing both gambling and alcohol addiction. While CBT was effective in reducing gambling behaviours, it did not lead to reductions in alcohol consumption and was associated with poorer outcomes, including higher dropout rates and lower compliance.
- Two qualitative studies explored the impact of self-management strategies for treating gambling addiction among individuals experiencing homelessness and poverty. These self-management strategies helped participants develop self-awareness and confront many barriers, including gambling addiction and financial and housing matters.

Evaluation of effective interventions for treating gambling addiction: findings

- The acceptability, feasibility and engagement of interventions for treating gambling disorder varied across all studies.
- Most studies reported engagement rates of 50% or higher for CBT, personalised feedback, and group or support-based interventions.
- Factors contributing to dropouts among patients included social gambling, non-compliance, demographic factors, and co-occurring substance abuse, with dropout rates tending to increase in the later stages of the intervention programmes.
- For Internet-based interventions, retention rates were high, and a greater number of patients completed treatment, indicating good feasibility and engagement.
- Where acceptability and satisfaction were measured, feedback was generally positive, with access, privacy, and personalised support identified as key factors influencing acceptability. Internet-based interventions received higher satisfaction rates overall.
- No primary studies evaluated the acceptability, feasibility or engagement of oral pharmacological treatment alone. However, one systematic review reported in the umbrella review (Section 3.3) indicated significant dropout rates for those taking opiate antagonists (nalmefene and naltrexone), due to poor tolerability.

Effective interventions for the treatment of gaming addiction: An umbrella review

- CBT was the most widely studied psychological intervention for treating gaming addiction, showing positive results in reducing symptom severity and gaming time, with individual CBT often more effective than group sessions.
- Reviews indicated variability in diagnostic methods and intervention strategies, but psychotherapy, especially CBT, had the highest significant effect size. Other interventions, such as virtual reality therapy (VRT) and transcranial direct-current stimulation (tDCS), showed some positive results, but further studies are required.
- Combined therapies, such as CBT with mindfulness or family interventions, were also particularly effective.
- Pharmacological treatments, particularly for co-occuring conditions such as ADHD and depression, also proved beneficial, with medications such as bupropion, methylphenidate (MPH) and atomoxetine (ATM) significantly improving Internet gaming disorder symptoms.
- Combined psychological and pharmacological treatments demonstrated the highest efficacy, with moderate-to-large effect sizes sustained at follow-up.

Treatment of gaming disorder for individuals with comorbid mental health conditions, other addictions, and those from marginalised groups

- Positive effects were observed for pharmacological, psychological and combined therapies in treating Internet gaming disorder, particularly in individuals with co-occurring mental health conditions.
- CBT showed the largest effect sizes among psychological interventions for treating Internet gaming disorder in this population.
- Pharmacological interventions evaluated included bupropion, MPH and ATM. Bupropion was the most-used drug for Internet gaming disorder co-occurring with ADHD, noted for its broad efficacy. MPH and ATM were also reported to be effective in managing ADHD symptoms, Internet gaming disorder, impulsivity, and reducing time spent online.
- Combined therapies demonstrated significant benefits, effectively addressing both Internet gaming disorder and related mental health conditions. These interventions may be transdiagnostic, resulting in the interventions not only being clinically effective, but also cost-effective, by targeting multiple conditions simultaneously.

Evaluation of effective interventions for treating gaming disorder: findings

- No studies were found that evaluated the acceptability of pharmacological interventions for treating gaming disorder, leaving a gap in this area of research.
- Engagement levels varied across psychological interventions, with most studies reporting engagement rates of 50% or higher. Factors such as time demands and time constraints were identified as significant barriers to sustained participation in the intervention programmes.
- Several studies emphasised the importance of family and adolescent-focused interventions, particularly for reducing gaming symptoms in this cohort. Support networks, including other parents, were also noted as beneficial for parental engagement and treatment success.

Cost-effectiveness of successful interventions for treating gambling and gaming disorders

- Only two studies relating to the cost-effectiveness of psychological interventions were identified. One study specifically assessed the cost-effectiveness of Internet CBT in a range of psychiatric disorders, including gambling disorder, reporting a 50% probability of being cost-effective when compared to either no treatment or conventional CBT.
- An economic analysis was undertaken to support the development of the UK draft guideline (Table 3) to assess the cost-effectiveness of a range of psychological and psychosocial treatments for adults experiencing problem gambling. Group CBT was identified as the most cost-effective treatment, with MI identified as the second. According to this economic evaluation, individual behavioural therapy and counselling are also likely to be cost-effective, compared to no treatment, especially considering that the public-sector cost estimates utilised in the model are likely to be an underestimate of the true costs associated with gambling-related harms.

Conclusion

This review synthesises the evidence from international guidelines on the treatment and management of gambling and gaming addictions.

Eighteen systematic reviews and meta-analyses were also narratively synthesised on the effectiveness of pharmacological and psychological interventions for treating gambling addiction, and nine were narratively synthesised on interventions for treating gaming addiction.

The results revealed a variety of psychological and pharmacological interventions for treating gambling or gaming addiction among various populations. In general, CBT has a larger evidence base than pharmacotherapy for treating both gambling and gaming disorders. However, the evidence supporting the use of pharmacological interventions varied across different population groups. For gambling disorder, an opioid antagonist (naltrexone) was identified for use in patients who had multiple relapses following psychological interventions, with medications such as bupropion, MPH and ATM significantly improving the symptoms of gaming addiction, especially in patients who have co-occurring ADHD.

There was significant heterogeneity across the included studies in relation to study designs, intervention characteristics, and screening and diagnostic tools, and this limits the ability to draw definite conclusions. Further high-quality studies are therefore required.

Although the overall quality of the included systematic reviews was generally low, the findings align with the recommendations from the two high-quality international guidelines included. The findings reported in this evidence review provide individuals, clinicians and policymakers with empirical evidence that psychological and pharmacological interventions produce clinically meaningful reductions in both gambling and gaming disorder severity and symptoms.

Section 1: Background

1.0 Introduction

With the rise in technology and online platforms, gambling and gaming have become widely accessible to people globally (Bijker et al., 2022). Gambling disorder and Internet gaming disorder are formally recognised as behavioural addictions, and there is a growing global public health concern about the rise in addictions linked to gambling and gaming. As a result, these were added to the International Classification of Diseases, 11th Revision (ICD-11), as a formal diagnosis of behavioural addictions (World Health Organization, 2019). They are defined as patterns of gambling/gaming behaviours that are characterised by a loss of control over the activity, prioritising gambling/gaming over other activities, and continuation of gambling/gaming despite the negative consequences therefrom (ibid.).

1.1 Gambling

The past decade has seen unprecedented growth in commercial gambling, and, as a result, it has increasingly been recognised as a significant public health concern (World Health Organization, 2024). Various terminologies have been used to describe potentially harmful gambling behaviours, including compulsive gambling, addictive gambling, problem gambling, and pathological gambling (Williams et al., 2012). Symptoms include an inability to control or reduce gambling behaviours, restlessness and irritability, jeopardising relationships, neglect of responsibilities, and dysphoria when attempting to stop (Augner et al., 2022). Unfortunately, this turns into a destructive cycle, wherein individuals attempt to recover their financial losses through more gambling. As a result of this, gambling negatively affects the physical and psychological health and the social functioning of the people who gamble and others around them (World Health Organization, 2024). Although most people have engaged in gambling at some point in their lives, unfortunately, for a small portion of the population, this activity becomes problematic, leading to addiction (Condron et al., 2022). Serious problem gambling was initially termed ‘pathological gambling’ in the third edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III). Following this, in the fifth edition, it was renamed ‘gambling disorder’ and reclassified into the ‘Addictions and Related Disorders’ category (Abbott et al., 2017).

1.2 Prevalence of gambling

A meta-analysis conducted in Australia found the global prevalence of pathological gambling to be 1.3%, while disordered gambling was reported to be 2.4% among adults (Gabellini et al., 2022). Findings indicated that the male population – particularly those of its members with substance use disorder, such as the abuse of alcohol or tobacco – is more likely to report having issues with excessive gambling than other cohorts. A more recently published meta-analysis, encompassing data from 67 countries, revealed that approximately 46.2% of adults had gambled in the past year. The study estimates that 8.7% of the global adult population who had gambled in the past 12 months classified their engagement in this activity as risk gambling, while the prevalence of problematic gambling was estimated to be at 1.4% globally (Tran et al., 2024). The rapid expansion of the gambling industry in low- and middle-income countries, as well as the widespread availability of it online, has contributed to an increase in these figures.

In Ireland, evidence on the prevalence of gambling addiction is limited, however, existing data highlights this to be a growing concern. In 2017, Ireland was ranked as the third-highest country in the world for gambling (Fulton, 2017). A study conducted by the Health Research Board (HRB) found that 49% of the Irish population gamble (Mongan et al., 2022). Findings from the *2019–20 Irish National Drug and Alcohol Survey* revealed that 0.3% of adults had experienced problem gambling, with males aged 35-49 being the most likely to report gambling in the previous year (ibid.). More recent findings from the Economic and Social Research Institute (ESRI) indicate a significant increase in gambling in Ireland, with approximately 3.3% (130,000) of the adult population in Ireland having identified as experiencing a gambling addiction (Ó Ceallaigh et al., 2023). Additionally, another 7.1% (279,000) of adults exhibited signs of problem gambling, indicating a need for gambling addiction to be addressed as a public health issue in Ireland (ibid.).

1.3 Diagnosing gambling disorder

Gambling disorder was diagnosed using the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V), based on the presence of specific criteria. For an individual to be diagnosed with gambling disorder, he/she/they must exhibit four or more of the listed behaviours within a 12-month period: being preoccupied with gambling and needing to gamble with increasing amounts of money in order to achieve desired excitement; feeling restless and irritable when attempting to stop or cut down on gambling; gambling when feeling distressed; gambling more after losing a significant amount of money in order to recover the loss; lying in order to conceal involvement with gambling; loss of relationships and career opportunities due to gambling; and/or relying on others to provide money to recover from a financial situation caused by gambling. The severity of the disorder is considered mild if four or five criteria are met, moderate for six or seven, and severe for eight or nine (Center for Behavioral Health Statistics and Quality, 2016).

1.4 Gaming

Although normal engagement in gaming can provide some social and physical benefits, excessive gaming and Internet gaming disorder can lead to severe interpersonal and health problems (Brand et al., 2020). Gaming addiction or Internet gaming disorder is characterised by impaired control over gaming, wherein individuals give increasing priority to gaming, to the extent that it takes precedence over other life interests, leading to the occurrence of negative consequences (Richard et al., 2023). The primary difference between gaming disorder and Internet gaming disorder is that while gaming disorder encompasses all types of gaming, taking place offline and online, Internet gaming disorder is specific to gaming that involves the use of the Internet (Darvesh et al., 2020). Symptoms of addictive gaming are similar to those of gambling, including depression and anxiety, social isolation, strained relationships, irritability, distress, and neglect of responsibilities (ibid.).

1.5 Prevalence of gaming

In 2022, the WHO officially classified 'gaming disorder, predominantly online' as a subtype of gaming disorder in the ICD-11 (World Health Organization, 2019). Research indicates that Internet gaming disorder affects a significant portion of adolescents and young adults globally, with variations in prevalence rates reported, with estimates suggesting a prevalence of 9.9% in this population group (Gao et al., 2022). A rapid scoping review reported varying prevalence rates of Internet gaming disorder. The prevalence ranged from 0.2% to 33.3% in Europe, 0.2% to 38.9% in the Region of the Americas, and 1.2% to 57.5% in the Western Pacific, with higher rates typically observed within the male adult population (Darvesh et al., 2020). A total of 160 studies including various designs used different methods to diagnose Internet gaming disorder in this review, and, therefore, due to the variability in diagnostic approaches, these wide prevalence rates should be interpreted with caution (ibid.). Another large-scale meta-analysis revealed that the global prevalence of Internet gaming disorder is as high as 3.1% (Richard et al., 2023). This has indicated that over the past decade, there has been an increasing trend in the global prevalence in Internet gaming disorder, making it a global public health concern (ibid.). In an online survey of 166 gamers in Ireland, Columb et al. (2020) found that 2.4% were classified as having a gaming disorder, with 5.4% exhibiting evidence of disordered gaming based on the Internet Gaming Disorder Scale–Short-Form (IGDS9-SF) criteria.

1.6 Treatment for gambling and gaming disorders in Ireland

Since 2023, the Health Service Executive (HSE) in Ireland has been piloting gambling- and gaming-specific community-based treatment services in two geographic areas. In 2025, this pilot programme will be expanded to five additional areas. These are the first publicly funded services specific to the treatment of problem gambling and gaming, for both adults and young people.

Historically, the treatment provided was often in addition to that provided to those experiencing mental health problems and alcohol and drug addiction. This treatment was not tailored to meet the specific

needs of those experiencing gambling or gaming addiction. With no specific treatment service, there was considerable variation in terms of how those with gambling or gaming addiction were treated. The lack of a systematic and coordinated approach to treatment was apparent in a study of gambling treatment referrals in HSE Community Health Organisations (CHOs) (Columb et al., 2018). The results found that no CHO provided a specific gambling service, and no CHO offered any service to children. For CHOs that did treat gambling addiction, few treatment options were available, with no dedicated referral pathways within mental health or addiction services. The need for dedicated referral pathways was also noted by Condron et al. (2022), who reported that only one in ten treatment referrals for gambling was from a health professional, such as a GP, or someone employed in mental health services.

The lack of dedicated treatment services in Ireland is likely to be a key contributory factor to the low numbers of people receiving treatment. From 2008 to 2019, there were 2,999 episodes of treatment recorded on the national treatment reporting system, which equates to an average of 273 per year during the period (ibid.). This is a fraction (less than 0.21%) of the ESRI's estimate of people experiencing problem gambling and represents a significant gap in treatment provision. It is currently not known if there were any treatment referrals for gaming outside of the HSE pilots. This demonstrates the need to consider a range of treatment types, to provide support for both those seeking treatment and those who are not seeking treatment. The need to develop gambling and gaming treatment services in Ireland has been recognised by the College of Psychiatrists of Ireland (2021) and the HRB (Mongan et al., 2022).

Ireland's public health system currently lacks a standardised approach to treating patients with gambling and gaming addictions (Columb et al., 2020). Inpatient gambling treatment is provided free of charge, with most people being treated as outpatients, primarily through addiction counselling. Outside the public health system, there are services (both voluntary and private) that provide treatment through helpline support or outpatient and inpatient settings, including some that receive funding from the gambling industry. The effectiveness of these interventions is unclear.

The considerable variations in terms of how people experiencing problem gambling and gaming are treated illustrates the demand for public health strategies at local and national levels in Ireland.

1.7 Purpose of this review

To produce a rigorous document relating to interventions, approaches and guidelines for the treatment of gambling and gaming addictions, this evidence review will include peer-reviewed and published literature, regional, national and international guidelines, and grey/unpublished literature.

1.8 Objectives

1. Identify and describe interventions, approaches and guidelines for the treatment of gambling and gaming addictions.
2. Describe how interventions are evaluated, the quality of evaluation methods, and the results in terms of engagement, service user outcomes, and user satisfaction.
3. Explore how well the interventions take into consideration service users with comorbid mental health problems and/or other addictions, and the needs of marginalised groups.
4. Unpack contexts and mechanisms that may serve as facilitators or barriers, to give an in-depth understanding of what works for whom, and under what circumstances.
5. Assess each intervention, where data is available, in terms of cost-effectiveness.
6. Identify through this process the most appropriate interventions that could be used in the Irish context to develop a comprehensive response to gambling and gaming addiction.

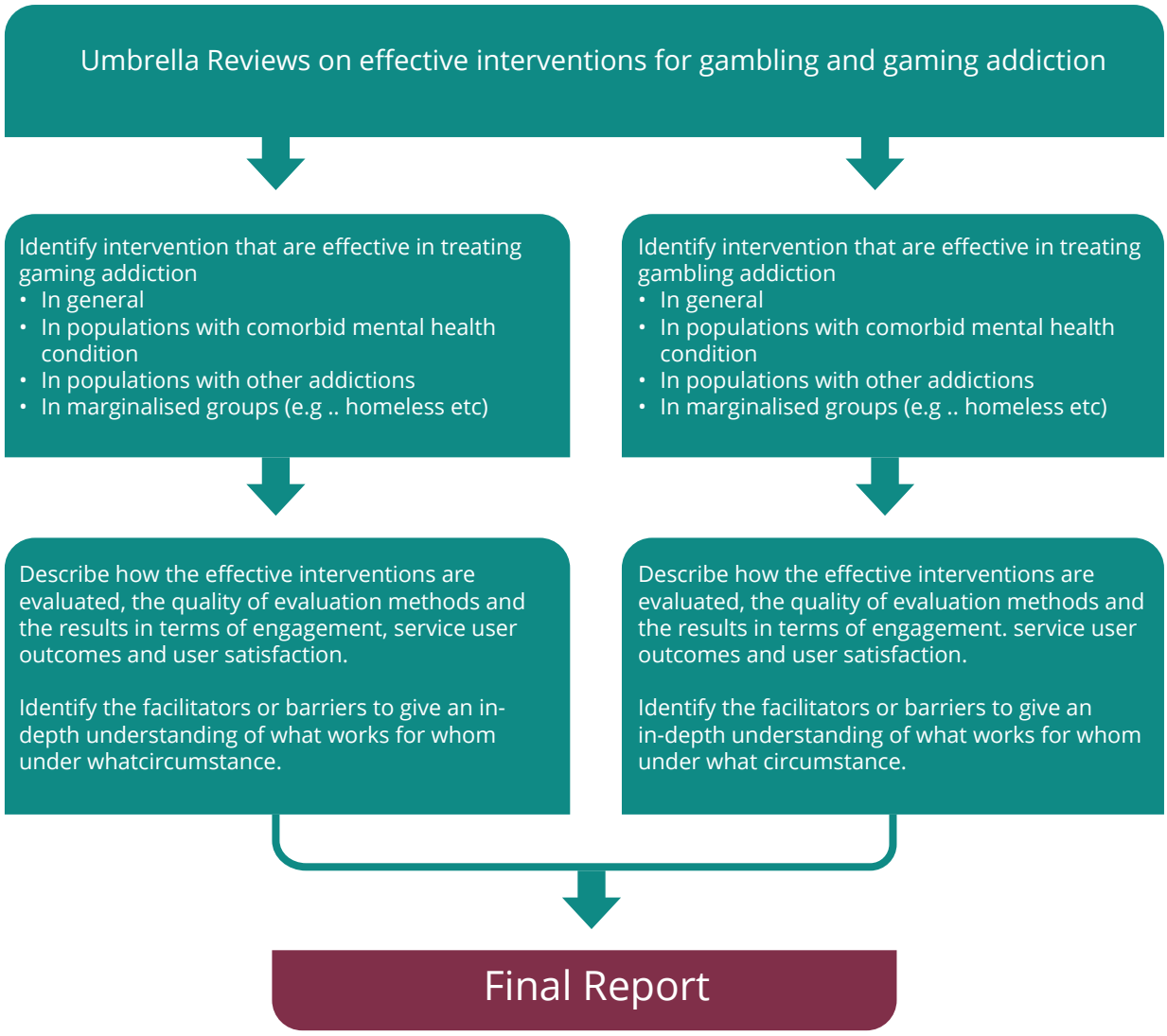
Section 2: Methods

2.0 Introduction

There were multiple approaches employed to meet the objectives of this evidence review. The first stage involved undertaking two separate umbrella reviews. An umbrella review is a systematic method to search for and identify multiple systematic reviews on related research questions in the same topic area for the purpose of extracting and analysing their results across important outcomes (Pollock et al., 2023). The first umbrella review was undertaken to identify effective interventions aimed at treating gaming addiction, and the second was to identify effective interventions aimed at treating gambling addictions. This approach was agreed due to the identification of a significant number of published systematic reviews in the evidence base during the scoping search. According to Aromataris et al. (2014), if there are systematic reviews already published over the previous five to ten years, these will most likely capture primary research studies published in the previous 30 years. In addition, conducting an umbrella review provides the ability to address a broad scope of issues related to a topic of interest, and it is ideal for presenting a wide picture of the evidence related to a particular question (ibid.).

The results of both umbrella reviews informed the second stage of this evidence review. Any evaluation studies that were undertaken on the effective interventions identified in both umbrella reviews were synthesised narratively. Additionally, findings from primary studies assessing the effectiveness of interventions for treating gambling or gaming addiction were narratively synthesised, with a focus on treating individuals with co-occurring mental health conditions, other addictions, marginalised groups, and cost-effectiveness studies. Figure 1 illustrates the process followed in undertaking this evidence review.

Figure 1: Process map evidence review



2.1 Search Strategy

A broad search strategy was used for this evidence review, to capture relevant information on effective interventions and evaluation studies on these effective interventions. This approach was chosen with the aim of capturing as much relevant evidence due to the scope of the review questions. A search for international guidelines was also undertaken.

Multiple stages were undertaken during the screening process. No limits were applied to the initial search, which was undertaken on 25 February 2024, however, the year 2000 was applied after the search was imported to Covidence. Articles not published in the English language were excluded at the full-text screening.

The Population, Intervention, Comparison, Outcome (PICO) framework (Table 1) was used to develop the search strategy for this review (Richardson et al., 1995). This framework ensured that a transparent and

comprehensive search was conducted. The following electronic databases were searched: Ovid MEDLINE, Ovid EMBASE, Ovid PsycINFO, EBSCO CINAHL Complete, Scopus, the Cochrane Database of Systematic Reviews, and the Database of Abstracts of Reviews of Effects (DARE). Reference lists of journal articles, guidelines and reports were also searched, to identify any additional literature. The initial search was performed in Ovid MEDLINE, using a combination of controlled vocabulary and free-text terms, to ensure maximum retrieval. The search terms were then adapted for the remaining electronic databases. Every effort was made to conduct the search as broadly as possible. Examples of the terms used in the literature search were *gambl**, *gambling disorder*, *Internet gambling disorder*, *gambling addiction*, *pathological gambling*, *gaming*, *gaming disorder*, *Internet gaming disorder* and *gaming addiction*. A full description of the searches, including the specific search terms used and the combinations applied, is provided in Appendix 1.

Searches for grey/unpublished literature or research published outside of the indexed journal article format, such as reports, preprints, or review protocols, were also searched, to supplement the electronic database searches. The websites of key organisations, nationally and internationally, were also searched for additional literature and international guidelines, including the World Health Organization (WHO), the Substance Abuse and Mental Health Services Administration (the US Department of Health and Human Services), the Royal Australian College of General Practitioners (behavioural addictions), the Canadian Centre on Substance Use and Addiction, the Ministry of Health Singapore, the Ministry of Health of the People's Republic of China, the International Center for Responsible Gaming, Public Health England (PHE), the National Institute for Health and Care Excellence (NICE) and the Health Service Executive (HSE). These were identified based on an examination of the organisational affiliations of key authors, as noted in key papers and reviews, and based on Internet searches. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram was used for the selection of sources for inclusion.

The search terms were drafted initially by the research team, with consultation from content experts and a health sciences subject librarian and information specialist at DCU. The search terms were adjusted, as appropriate, to ensure that the evidence retrieved reflected the relevant objectives. A combination of MeSH terms, wildcards and keywords was included, as appropriate. The searches were saved in each of the electronic databases and filtered to automatically run each month, allowing the literature to be critically reviewed on an ongoing basis up until 31 July 2024.

Table 1. PICO framework

PICO	Inclusion criteria	Exclusion criteria*
Population	Diagnosed with gambling or game-related addiction through scales or clinical criteria.	Exclude all other addictions.
Intervention	Any intervention (pharmacological, psychological or other) implemented with the aim of treating individuals with gambling or gaming addiction. For this review, the intervention may consist of either single or multiple components, face to face or online.	
Comparison	To another intervention or no intervention/ control/placebo.	
Outcome(s)	**Primary outcome:** Any change in gambling or gaming behaviours. **Secondary outcomes:** Comorbid mental health conditions; feasibility, acceptability, and cost-effectiveness of implementing the effective interventions; barriers and facilitating factors to implementing the interventions.	
Study design/setting	**Umbrella review(s):** Systematic reviews that evaluate the effectiveness of interventions. **Evaluation studies:** Primary studies that evaluate the effectiveness of interventions, in terms of cost-effectiveness and/or barriers or facilitating factors associated with implementation of these interventions (for service users).	Exclude studies before 2000 and/or those not in English. **Umbrella review on gambling addiction:** Exclude systematic reviews that do not perform a meta-analysis.

*Systematic reviews that did not perform a meta-analysis on interventions for treating gambling addictions only were excluded at the data extraction stage, due to the large quantity of already published systematic reviews and meta-analyses.

2.2 Eligibility criteria

All study types were initially included in this evidence review. These include, but were not limited to, guidelines, reports, systematic reviews, and quantitative, qualitative and mixed-method designs that evaluated interventions aimed at treating gambling or gaming addiction. The eligibility criteria were then adjusted to meet each objective.

To assess the quality and evaluation of these interventions, studies explicitly identified by the research team as a process evaluation, or studies that aimed to understand the functioning of an identified effective intervention by examining implementation, the mechanisms of impact, and contextual factors, were also included.

2.3 Study selection

Records identified in the search were imported to a Zotero library and duplicates removed. These records were then imported to Covidence software for systematic reviews, and any additional duplicates were removed. All results were screened independently by title and abstract, and then by full text, by at least two reviewers. Any conflicts were resolved by discussion, with reference to a third reviewer where needed.

2.4 Screening

The title and abstract screening was undertaken independently by at least two members of the review team in Covidence. Due to the large volume of primary research articles identified for a full-text review, multiple tags (or labels) were assigned to these primary studies in Covidence. These allowed the review team to filter and screen the primary literature to meet each objective.

These tags/labels consisted of:

- a systematic review and meta-analysis on interventions for gaming addiction;
- a systematic review and meta-analysis on interventions for gambling addiction;
- a systematic reviews and meta-analyses on addiction interventions;
- evaluation studies (barriers/facilitators/feasibility) on interventions for gaming addiction;
- evaluation studies (barriers/facilitators/feasibility) on interventions for gambling addiction;
- cost-effectiveness studies on interventions for treating gaming or gambling addiction; and
- effective intervention studies on treating gaming or gambling addiction within marginalised groups, and those with other addictions and/or comorbid mental health conditions.

A full-text review was also undertaken by two members of the review team and involved several phases. The first phase consisted of two members independently reviewing the systematic reviews and meta-analyses that were tagged on interventions for treating addictions.

The second phase consisted of reviewing the full texts on all systematic review and meta-analysis interventions for gaming addiction. This was followed by two members independently reviewing the evaluation studies (barriers/facilitators/feasibility) on the effective interventions that were identified in the umbrella review for gaming addiction.

The third phase involved two members of the review team reviewing the systematic review and meta-analysis for interventions for gambling addiction, followed by reviewing the full-text studies on the evaluation studies (barriers/facilitators/feasibility) on the effective interventions identified in the umbrella review for gambling addiction.

The fourth phase involved reviewing the full text on effective interventions for treating gaming or gambling addiction among marginalised groups, those with other addictions and/or comorbid mental health conditions, and cost-effectiveness studies of interventions. The final phase involved reviewing the international guidelines on the treatment and management of gambling or gaming addiction.

2.5 Data extraction

A data extraction tool was developed based on the JBI template for umbrella reviews (Aromataris et al., 2014). The data were extracted by one reviewer and validated by a second. The data extracted included reference details, search dates, the date ranges of included primary studies, the study design of the primary studies, the population group, the intervention description and type (method of delivery, duration and regime, if available), the comparator, the description of outcomes assessed (primary and secondary), the results by each outcome, and the overall quality of the review. The data extracted for the included guidelines consisted of the country, the year of publication, the publishing organisation, guideline recommendations, and overall quality.

2.6 Quality Assessment

2.6.1 Assessing the quality of included guidelines

A quality assessment was undertaken independently by two members of the research team. The AGREE II tool was used to assess the quality and risk of bias (RoB) of the included guidelines (Brouwers et al., 2017).

The AGREE II tool consists of 23 key items organised across six domains, followed by two global rating items (overall assessment), with each domain capturing a unique dimension of guideline quality. These domains consist of three items under domain one (scope and purpose), three items under domain two (stakeholder engagement), eight items under domain three (rigour of development), three items under domain four (clarity of presentation), four items under domain five (applicability), and two items under domain six (editorial independence). A quality score was calculated for each of the six AGREE II domains by summing up all the scores of the individual items in each domain, and by scaling the total as a percentage of the maximum possible score for that domain (2017).

Example:

If the two appraisers gave the following score for domain one (scope and purpose):

	Item 1	Item 2	Item 3	Total
Appraiser 1	7	7	7	21
Appraiser 2	7	7	7	21

Maximum possible score=7 (strongly agree) x3 (items) x2 (appraisers) =42 Minimum possible score=1 (strongly disagree) x3 (items) x2 (appraisers) =6

The scaled domain score was:
Obtained score minus minimum possible score/maximum possible score minus minimum possible score.

2.6.2 Assessing the quality of included systematic reviews

The AMSTAR 2 tool was used to assess the quality and risk of bias (RoB) of the included systematic reviews (Shea et al., 2017). The AMSTAR 2 consists of 16 items and has an overall rating based on weaknesses in critical domains. AMSTAR 2 is not designed to generate an overall 'score', and a high score may disguise critical weaknesses in specific domains, such as an inadequate literature search or a failure to assess RoB with individual studies that were included in a systematic review. Shea et al. (ibid.) propose a scheme for interpreting weaknesses detected in critical and non-critical items. Although there are seven critical domains highlighted, this is advisory, and, according to the authors, appraisers should decide which items are most important for the reviews under consideration. As a result of this, and following discussions with all members of the evidence review team, we also identified Item 10 – 'Did the review authors report on the sources of funding for the studies included in the review?' – as a critical domain.

The eight critical domains assessed for this review were:

- protocol registered before commencement of the review (Item 2);
- adequacy of the literature search (Item 4);
- justification for excluding individual studies (Item 7);
- RoB from individual studies being included in the review (Item 9);
- appropriateness of meta-analytical methods (Item 11);
- consideration of RoB when interpreting the results of the review (Item 13);
- assessment of presence and likely impact of publication bias (Item 15); and

- (added as a critical domain for the purpose of this review) did the review authors report on the sources of funding for the studies included in the review (Item 10)?

Following the AMSTAR 2 assessment for each included systematic review, we assigned a confidence rating by assessing each item in the instrument (Table 2).

Table 2. Rating overall confidence in the results of the review (Shea et al., 2017)

High	No or one non-critical weakness: the systematic review provides an accurate and comprehensive summary of the results of the available studies that address the question of interest.
Moderate	More than one non-critical weakness:* the systematic review has more than one weakness, but no critical flaws. It may provide an accurate summary of the results of the available studies that were included in the review.
Low	One critical flaw with or without non-critical weaknesses: the review has a critical flaw and may not provide an accurate and comprehensive summary of the available studies that address the question of interest.
Critically low	More than one critical flaw with or without non-critical weaknesses: the review has more than one critical flaw and should not be relied on to provide an accurate and comprehensive summary of the available studies.

*Multiple non-critical weaknesses may diminish confidence in the review, and it may be appropriate to move the overall appraisal down from moderate to low confidence.

2.7 Synthesis

Umbrella reviews are typically broader in scope than reviews of interventions, and, according to Lunny et al. (2017), they have many purposes, including mapping the available evidence and identifying gaps in the literature, summarising the effects of the same intervention for different conditions or populations, and/or examining reasons for the discordance of findings and conclusions across systematic reviews. The primary studies within the individual systematic reviews differed significantly in their diagnostic methods, with each employing different criteria to screen for gambling or gaming disorder among participants. Additionally, there was variability in the types of psychological interventions used, particularly CBT, and the definitions of primary outcome measures. Due to these variations in definition, diagnosis, and the type of intervention strategies evaluated, we decided to narratively synthesise the evidence on effective interventions by type (e.g. pharmacological, psychological) and presented the data in tabular format.

In addition to the two umbrella reviews, a narrative synthesis was provided on the primary studies evaluating the effectiveness of interventions for treating gambling or gaming addiction in populations with comorbid mental health conditions and/or other addictions and marginalised groups, as well as studies assessing the engagement, feasibility and acceptability of these interventions. The key recommendations from the included international guidelines were also presented narratively and in tabular format.

2.8 Overlap

As the number of published systematic reviews increases (Page et al., 2016), it has become increasingly common for umbrella review authors to identify two or more relevant systematic reviews that address the same (or very similar) research questions, and that include many (but not all) of the same primary studies (Pollock et al., 2023). Including overlapping reviews may introduce bias by including the same primary study's outcome data in an overview multiple times because the study was included in multiple systematic reviews.

To date, umbrella review authors have used several approaches to deal with and manage overlapping reviews in a transparent way. The most appropriate approach depends on the purpose of the umbrella review and on the method of data analysis. For example, if the purpose is to answer a new review question about a subpopulation of the participants included in the existing systematic reviews, the authors may wish to re-extract and reanalyse the outcome data from a set of non-overlapping reviews. However, if the purpose is to present and describe the current body of systematic review evidence on a topic, it may be appropriate to include the results of all relevant systematic reviews, regardless of topic overlap (ibid.). To deal with overlap in this evidence review, we used a citation matrix, which illustrates the overlap of primary studies over time in the included review studies and visually demonstrates the amount of overlap. We also narratively describe the number and size of the overlapping primary studies in each umbrella review (Arian et al., 2021).

Section 3: Findings

3.0 Introduction

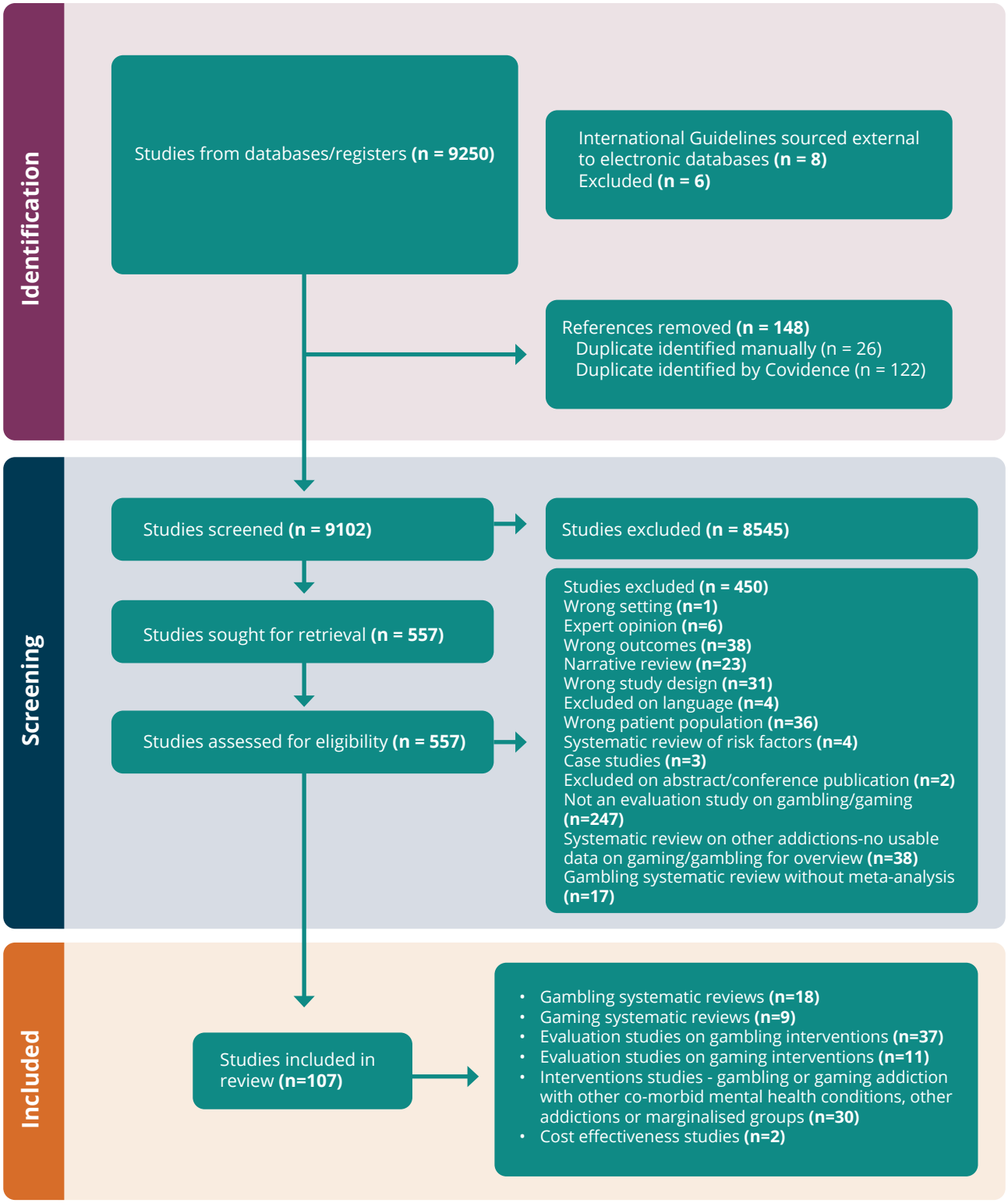
This review provides a comprehensive examination of the evidence for the treatment and management of gambling and gaming addictions. The findings are presented in a structured format, to ensure clarity and accessibility. First, the results of the full search are outlined, followed by a summary of the international guideline recommendations for managing and treating gambling and gaming addictions. Subsequently, findings from the first umbrella review on effective interventions for gambling addiction are discussed. This is supplemented by a narrative synthesis focusing on interventions for individuals with comorbid mental health conditions, other addictions, and marginalised groups, along with an evaluation of these interventions in terms of acceptability, feasibility and engagement.

The findings transition to gaming addiction, beginning with findings from the second umbrella review on effective interventions, as no international guidelines were identified for its treatment. A narrative synthesis is presented, exploring interventions for gaming addiction in individuals with comorbid mental health issues, other addictions, and marginalised populations. Primary studies evaluating the engagement, feasibility and acceptability of these interventions are also examined. Finally, the findings address primary research on the cost-effectiveness of interventions for treating both gambling and gaming addictions.

3.1 Search results

The initial electronic search yielded 16,632 citations. No records were identified through searching the grey/unpublished literature. After duplicates were removed (n=7,524), a total of 9,102 records were screened by title and abstract (Figure 2). After closely examining the titles and abstracts, a total of 557 records were identified as potentially eligible and assessed for a full-text screening. A total of 107 records were identified for data extraction. An additional eight guidelines were identified, of which two were included for data extraction. The PRISMA flow chart in Figure 2 illustrates the information detected throughout the searching-and-screening process.

Figure 2. PRISMA flow chart



3.2 International guidelines for treating gambling and gaming addictions

A total of eight guidelines were identified at the full-text stage. Only two guidelines were included in this review (Table 3). Of the six guidelines excluded, five provided guideline recommendations for the management of gambling addiction. Of these, one guideline was excluded due to low quality (<70% in each domain), using the AGREE II tool, one provided recommendations on other addictions (alcohol only), two did not provide recommendations for the treatment and management of gambling addiction, and one guideline was published as a manuscript and provided evidence from two primary studies that were included in the umbrella review in Section 3.3.

One editorial summary was published on a guideline for the management of gaming addiction, however, we were unable to source the full guideline, and it was published in Chinese. A full list of these excluded guidelines is available in Appendix 2.

Table 3. Included guidelines for the treatment and management of gambling addiction

Publisher: National Institute for Health and Care Excellence (NICE)	**Country:** UK **Published:** UK	**Title:** *Gambling-related harms: identification, assessment and management* **AGREE II assessment:** All domains scored >70%.

Recommendations (Please note, at the time of preparing this review, these guidelines were in draft format.)

These recommendations are for commissioners and providers of gambling treatment services.

Assessment of gambling-related harms in specialist settings

Consider using a tool to assess gambling-related harms. Use an up-to-date validated tool such as the South Oaks Gambling Screen (SOGS) or the Problem Gambling Severity Index (PGSI).

Discuss the person's gambling with them and assess the following:

- gambling history (when the gambling started and how it has progressed, including when the frequency or intensity increased)
- current frequency of gambling (for example, days per week or hours per day)
- financial impact of gambling (for example, money spent on gambling as a proportion of income, borrowing or stealing money for gambling)
- how gambling affects other aspects of their life (for example, financial, social functioning, interpersonal relationships, employment, education and whether it has led to any involvement in crime)
- impact of gambling on their mental health (for example, depression, anxiety, insomnia)

- type of gambling activities
- factors that may contribute to their continued gambling (for example, triggers and cravings, how thoughts and emotions may have been distorted, role of advertising and marketing)
- psychological functions of gambling for them, or the motivation for gambling
- alignment to DSM criteria for gambling disorder
- reasons for seeking support, motivation to change, expectations and goals of treatment
- risk of suicide
- safeguarding issues or concerns
- medical history, including physical and mental health, comorbidities, and alcohol and substance use
- their immediate needs (for example, help with housing food, debts).

General principles of treatment

Recognise that the holistic care of people experiencing gambling-related harms, including those affected by the gambling of others, should include multidisciplinary teams where necessary, for example, healthcare staff, social care staff and voluntary sector organisations.

Involve a partner, family member or other person close to the person experiencing gambling-related harms in their treatment and in communication with the care team, if that is what they both want. Discuss that it may be useful to meet individually and jointly.

Discuss and agree the aim of treatment for harmful gambling (typically abstinence) with the person experiencing gambling-related harms. Discuss with the person, and those close to them if present, if they have any other goals that are important to them, for example:

- reducing financial difficulties
- improving relationships
- reducing anxiety and distress

Provide gambling-specific treatments that have evidence of efficacy and cost-effectiveness for treating harmful gambling. This applies to all settings, including in the criminal justice system.
Ensure that a variety of methods (including online and in person) are available for delivering treatments. Discuss the different methods with the person, including that:

- online treatment may be more convenient and less time-consuming than in-person treatment
- in-person treatment is more likely to lead to the development of a supportive therapeutic relationship than online treatment, and this may help ongoing engagement with treatment.

Recognise that some mental health conditions and other comorbidities may be:

- a consequence of gambling-related harms and may resolve or improve with successful treatment for harmful gambling, or
- underlying conditions which occur before or alongside gambling-related harms and require concurrent treatment, or

- so severe (for example, severe PTSD, or alcohol or drug dependence) that they require treatment first, to improve engagement with treatment for harmful gambling.

Ensure that there are established links with services to treat comorbidities (for example, alcohol or drug abuse, or cognitive, mental and physical health problems) or in-house expertise, to provide a timely, comprehensive, coordinated service for people with comorbidities and avoid the need for multiple appointments with different services.

Treatments for harmful gambling should be delivered by trained, competent practitioners who meet agreed competency framework criteria, including those who provide peer support or facilitate group therapies.

Practitioners providing treatments for harmful gambling should deliver these in a way that:

- is understanding, empathetic, supportive, and helpful
- encourages ownership and engagement by the person experiencing gambling-related harms
- avoids minimising concerns and stigma
- develops and builds a therapeutic relationship with the person
- encourages a 2-way dialogue and ongoing communication
- provides continuity of care wherever possible.

Peer support

Offer peer support as an integral part of the support and treatment for gambling-related harms for people who wish to engage with it.

Explain that peer support can provide:

- an opportunity to discuss aspects of recovery (social and personal) with others who have been through the same experiences
- an opportunity to discuss topics that might feel stigmatising (for example, relapse)
- encouragement to continue with treatment.

Psychological treatment for harmful gambling

Consider motivational interviewing to encourage people who are unsure or have reservations about starting treatment, or to strengthen people's commitment to change.

Offer group CBT to reduce gambling severity and frequency. Start treatment as soon as possible after diagnosis.

Offer individual CBT if group therapy is not possible (for example, there are no other people available to form a group), it is assessed as not suitable for the person, or the person does not wish to join a group.

CBT should:

- be delivered as a group intervention by two practitioners, at least one of whom has gambling-specific CBT training and competence, or as an individual intervention by one practitioner with gambling-specific CBT training and competence

- be delivered in line with current treatment manuals
- be provided as a course, usually with 8-10 sessions for group therapy or 6-8 sessions for individual therapy
- include a relapse prevention component (covering, for example, how to deal with triggers).

Pharmacological treatment for harmful gambling

Consider naltrexone to treat harmful gambling if:

- psychological treatments have not achieved the desired outcomes after an appropriate course of treatment has been completed, or
- the person has repeated relapses with psychological treatment. In August 2023, this was an off-label use of naltrexone.

Naltrexone should be started by, or under the supervision of, an appropriately qualified or experienced specialist. After the initial prescription, subsequent prescriptions may be issued in primary care using a shared care agreement. Consider continuing psychological treatment in combination with naltrexone.

When starting naltrexone:

- check kidney and liver function
- advise people to avoid opioids while taking naltrexone
- consider an initial dose of 25 mg once a day for three days, then increase the dose to 50 mg once a day for 4-6 months
- agree a follow-up plan with the person to regularly monitor for effectiveness, safety and side effects (for example, regular liver function tests, the onset of chest pain or palpitations).

Relapse and ongoing support

These recommendations are for commissioners and providers of gambling treatment services. Recognise that relapse in people whose gambling-related harms have decreased after treatment can be distressing for the person and may increase the risk of suicide or self-harm. Discuss the risk of relapse with people experiencing harmful gambling.

Include that:

- relapse is not shameful, may be part of a recovery journey and does not indicate individual failure
- relapse can occur due to individual or environmental factors
- understanding the causes and triggers which may lead to relapse, including exposure to advertising and marketing, may be helpful
- skills and techniques can be taught during treatment to reduce the chance of relapse (for example, stimulus control and strategies for coping with high-risk situations).

Continue to provide support, follow-up, and rapid re-access after a course of psychological or pharmacological treatment according to the person's needs and preferences.

Consider additional treatment or support for people:

- where the agreed outcomes have not been achieved through the original intervention
- who may be at higher risk of relapse
- who have lapsed or relapsed.

Discuss with the person what additional treatment or support they may need. This could include:

- additional sessions of treatment (for example, CBT)
- other support, such as peer support or support groups
- support with legacy harms (for example, relating to employment, finance, health, housing, relationships, or legal issues), which may be provided by the voluntary sector or other organisations.

Publisher: Australian Government, National Health and Medical Research Council	**Country:** Australia **Published:** 2011	**Title:** *Guideline for Screening, Assessment and Treatment in Problem Gambling* **AGREE II assessment:** All domains scored >70%.

Recommendations

Screening & assessment: Due to lack of evidence, no evidence-based recommendations could be made regarding the screening or the assessment of people who may have gambling problems. Consensus-based recommendations were made.

Screening & assessment consensus-based recommendation 1: Those who screen positive for problem gambling using an initial brief (i.e.1-3 items) screening tool could be referred for further assessment and treatment by appropriately trained specialist practitioners in problem gambling. Screening could be used in primary care settings where at-risk clients may be presenting for services. These may include people who present for other mental health problems [and/or] people who come from groups with relatively high rates of problem gambling.

Screening & assessment consensus-based recommendation 2: Adults with a high risk of mental health problems, including those who are presenting for treatment or for assessment for mental health problems, could be screened and assessed for problem gambling using a validated measurement tool or tools. The recommended tools are Brief (1-3 items) – Brief Bio-Social Gambling screen (BBGS); Lie-Bet Questionnaire; NODS-CLiP; Medium (4-12 items) – Problem Gambling Severity Index (PGSI) or the Canadian Problem Gambling Index (CPGI); Long (>13 items) – South Oaks Gambling Screen (SOGS); Victorian Gambling Screen (VGS); Problem and Pathological Gambling Measure (PPGM).

Screening & assessment consensus-based recommendation 3: Adolescents and children with a high risk of mental health problems, including those who are presenting for treatment or for assessment for mental health problems, could be screened and assessed for problem gambling using a validated measurement tool or tools. The recommended tools are: 1) Diagnostic and Statistical Manual-IV-Multiple Response-Adapted for Juveniles (DSM-IV-MR-J) and 2) Gambling Problem Severity Subscale (GPSS) of the Canadian Adolescent Gambling Inventory (CAGI).

Practice point 1: The original and validated versions and scoring protocols of all tools could be utilised in epidemiological and clinical settings.

Practice point 2: A structured clinical interview may be required for a full assessment, e.g. Diagnostic Interview for Gambling Severity (DIGS), Structured Clinical Interview for Pathological Gambling (SCI-PG).
Practice point 3: People with a high risk of gambling problems, including those who are presenting for treatment or for assessment for gambling problems, could be screened for other mental health problems, including: anxiety disorders, depression (if depression is evident, then suicide risk-screening protocols ought to be sought), personality disorders, alcohol dependence, drug dependence, other impulse control disorders, family violence.

Treatment recommendations (evidence-based recommendation 1): Individual or group Cognitive Behavioural Therapy should be used to reduce gambling behaviour, gambling severity and psychological distress in people with gambling problems. Practice point: Where Cognitive Behavioural Therapy is to be prescribed, the following could be considered: practitioners with appropriate qualifications and training; manualised delivery of the intervention.

Treatment recommendations (evidence-based recommendation 2): Motivational interviewing and Motivational Enhancement Therapy should be used to reduce gambling behaviour and gambling severity in people with gambling problems. Practice Point: Practitioners with appropriate qualifications and training could be considered. Manualised delivery of Motivational Enhancement Therapy could be considered.

Treatment recommendations (evidence-based recommendation 3): Practitioner-delivered psychological interventions should be used to reduce gambling severity and gambling behaviour in people with gambling problems. Practice Point: Where practitioner-delivered psychological interventions are to be prescribed, the following could be considered: client preferences; availability of services; practitioners with appropriate qualifications and training; manualised delivery of the intervention.

Treatment recommendations (evidence-based recommendation 4): Practitioner-delivered psychological interventions should be used over self-help psychological interventions to reduce gambling severity and gambling behaviour in people with gambling problems. Practice Point: Where practitioner-delivered psychological interventions are to be prescribed, the following could be considered: client preferences, availability of services, practitioners with appropriate qualifications and training, manualised delivery of intervention.

Treatment recommendations (evidence-based recommendation 5): Group psychological interventions could be used to reduce gambling behaviour and gambling severity in people with gambling problems. Practice Point: Where group psychological interventions are to be prescribed, the following could be considered: client preferences, availability of services, practitioners with appropriate qualifications and training, manualised delivery of intervention.

Treatment recommendations (evidence-based recommendation 6): Antidepressant medication should not be used to reduce gambling severity in people with gambling problems alone. Practice Point: Due to the nature of the sample's studies, this recommendation is applicable to those with gambling problems only, and not to those who may have other comorbidities, such as depression and anxiety. This recommendation is predominantly based on evidence evaluating the effectiveness of selective serotonin-reuptake inhibitors.

3.2.1 Summary of findings from international guidelines

This summary of findings highlights key recommendations from two international guidelines – one from Australia (2011), and a more recent **draft** set of guideline recommendations from the UK (2024) – on the treatment and management of gambling addiction. Despite the Australian guideline being older, both align with current best practices in guideline development.

The UK draft guideline emphasises the importance of using current, up-to-date validated screening tools, such as the South Oaks Gambling Screen (SOGS) or the Problem Gambling Severity Index (PGSI). The Australian guideline suggests using various screening tools, based on expert consensus.

Both guidelines recommend screening for gambling disorder in individuals with high-risk mental health conditions (such as those undergoing mental health assessments or treatments), reinforcing the growing recognition of the link between gambling addiction and co-occurring mental health issues.

Both guidelines support the use of psychological interventions, particularly CBT or MI, as first-line treatments. A pharmacological intervention, particularly naltrexone, is also recommended if psychological interventions fail to achieve the desired outcome, or in cases of repeated relapse with psychological interventions alone. These psychological and pharmacological recommendations are evidence based, reflecting a holistic approach to treating and managing gambling addiction.

3.3 Effective interventions for the treatment of gambling addiction: An umbrella review

3.3.1 Introduction

This section presents the findings of an umbrella review that examines effective interventions – both psychological and pharmacological – for treating gambling addiction. The evidence is synthesised narratively, drawing from published systematic reviews and meta-analyses, to provide a comprehensive overview of current treatment approaches.

3.3.2 Results

During the full-text screening stage, 34 systematic reviews were identified. Of these, 18 met the inclusion criteria for systematic review and meta-analysis. A detailed list of excluded reviews, along with the justification for their exclusion, is provided in Appendix 3. The 18 included reviews collectively evaluated 130 primary research studies on the effectiveness of interventions for treating gambling addiction. There was a significant overlap of primary research studies across the reviews, with 70 out of 130 studies (53.8% overlap) being reported in at least two reviews (Appendix 4).

3.3.3 Characteristics of included studies

The main characteristics of the included systematic reviews are presented in Table 4. In terms of design, we only included systematic reviews and meta-analyses in our synthesis to provide the clearest and most robust evidence available. Five systematic reviews and meta-analyses assessed the effectiveness of pharmacological interventions in treating gambling addiction (Bartley and Bloch, 2013; Dowling et al., 2022; Goslar et al., 2019;

Ioannidis et al., 2023; Pallesen et al., 2007), 13 assessed the effectiveness of psychological interventions (Augner et al., 2022; Cowlishaw et al., 2012; Eriksen et al., 2023; Goslar et al., 2017; Gooding and Tarrier, 2009; Maynard et al., 2018; Yakovenko et al., 2015; Pallesen et al., 2005; Peter et al., 2019; Pfund et al., 2020; Pfund et al., 2023; Quilty et al., 2019), and one assessed the effectiveness of non-invasive brain stimulation (NiBS) (Del Mauro et al., 2023).

The publication dates for all 18 included systematic reviews ranged from 2005 to 2023. The number of primary research studies included in each review varied from seven to 39 and were published between 2002 and 2023. Seventeen reviews included adult populations, while one focused exclusively on adolescents and adults (>16 years) (Quilty et al., 2019).

The primary studies within the individual systematic reviews differed significantly in their study designs, intervention types, outcome measures and diagnostic criteria. Due to this, a narrative synthesis of the evidence is presented in this section, on the direction of effect and the strength of effect reported by each individual systematic review. The pooled estimated and effect sizes reported in each of the 18 systematic reviews are displayed in Table 4.

The source of funding was inconsistently reported across the 18 included reviews. Fourteen reviews provided information on their own funding sources, with only five reporting the funding sources for the included primary studies. This is further examined in Section 5.3.1.

3.3.4 Pharmacological interventions

Five reviews, including 32 primary research studies, evaluated the effectiveness of pharmacological interventions for treating gambling addiction (Bartley and Bloch, 2013; Dowling et al., 2022; Goslar et al., 2019; Ioannidis et al., 2023; Pallesen et al., 2007). Seventeen of these primary research studies overlapped across all five reviews (52.1% overlap). The primary studies in these reviews evaluated several different categories of medications, including antidepressants, opioid antagonists, mood stabilisers, anticonvulsants (topiramate), and atypical antipsychotics.

A meta-analysis of 16 studies conducted by Pallesen et al. (2007) assessed the effectiveness of pharmacological interventions for treating gambling addiction. The analysis found a large overall effect size, suggesting that pharmacological treatments led to significant improvements at post-treatment. However, no significant differences were observed between the three main classes of medications: antidepressants, opiate antagonists, and mood stabilisers. The quality of this review, however, was rated critically low.

In contrast, Bartley and Bloch (2013) reviewed 14 trials evaluating the efficacy of pharmacological treatments for pathological gambling on gambling severity. The results demonstrated a small but significant effect from five trials that investigated an opioid antagonist (naltrexone), compared to a placebo (standardised mean difference (SMD) = 0.22 ± 0.10, [95% CI: 0.03 to 0.41], z=2.3, $p < 0.05$) (Table 4). Six trials assessed the effects of antidepressant agents, two examined the efficacy of an antipsychotic agent (olanzapine), and one evaluated topiramate (an anticonvulsant). The results found a small, non-statistically significant effect when compared to placebo (SMD = 0.40 ± 0.31, [95% CI: -0.21 to 1.01], z=1.3, p=0.20). The quality of this review was rated critically low.

Goslar et al. (2018) conducted a review of 39 trials, reporting short-term reductions in gambling severity and frequency. Among the medication classes examined, opioid antagonists (Hedge's g=1.41, [95% CI:1.22 to 0.80], $p<0.001$) and mood stabilisers (Hedge's g=1.23, [95% CI: 0.88 to 1.58], $p<0.001$) produced a significant, large effect size for reducing gambling severity. The quality of this review was rated critically low.

More recently, Dowling et al. (2022) undertook a Cochrane systematic review and pairwise meta-analysis, including 17 trials, to examine the efficacy of antidepressants, opioid antagonists, mood stabilisers and atypical

antipsychotics on disordered or problem gambling. Four studies in this review evaluated opioid antagonists (two evaluated nalmefene, and two evaluated naltrexone), finding evidence indicating a medium beneficial effect on gambling symptom severity relative to placebo at post-treatment (SMD = −0.46, [95% CI:−0.74 to −0.19], p<0.001). Additionally, two studies evaluated the atypical antipsychotic olanzapine, showing a medium beneficial effect of treatment on gambling severity (SMD = −0.59, [95% CI: −1.10 to −0.08], p=<0.05). In contrast, the findings were inconclusive regarding the effectiveness of mood stabilisers (including anticonvulsants) in the treatment of disordered or problem gambling, and there was limited evidence to support the efficacy of antidepressants (fluvoxamine, paroxetine and sertraline, and the NDRI bupropion). The results from one included trial in this review also showed that antidepressants (SSRIs) were no more effective than placebos when conditions were compared on gambling frequency at the end of the six-month treatment, and for time spent gambling at the end of 12 weeks' treatment. This high-quality review provides preliminary support for the use of opioid antagonists (naltrexone, nalmefene) and atypical antipsychotics (olanzapine) in producing short-term improvements in gambling symptom severity. Although this review was rated as high quality, concerns were raised by the review authors about potential bias, as 12 primary studies received financial support from pharmaceutical companies to conduct them.

Ioannidis et al. (2023) undertook a network meta-analysis across 16 trials, corroborating these findings. The results found that nalmefene (SMD: -0·86, [95% CI: -1·32 to -0·41]) reduced gambling severity, followed by naltrexone (SMD: -0·42, [95% CI: -0·85 to 0·01]. However, it is important to note that nalmefene (odds ratio (OR): 7·55, [95% CI: 2·24 to 25·41]) and naltrexone (OR: 7·82, [95% CI: 1·26 to 48·70]) had significantly higher dropouts due to side effects (lower tolerability), compared to the placebo group. Olanzapine (an atypical antipsychotic) and topiramate (an anticonvulsant) were not identified to be more efficacious than placebo groups in this review. The quality of this review was rated critically low.

Table 4. Characteristics of included systematic reviews and meta-analysis – Gambling Addiction Interventions

Author (year)	Date of search	Range (years) of incl. studies	Study design of incl. studies (n)	Population (n) and characteristics	Intervention(s) (n) vs comparison	Outcomes	Results	AMSTAR 2 Quality
Pharmacological interventions (n=5)								
Dowling et al. (2022)	NR	Up to 11 January 2022	*RCTs n=17	n=1193 EG n=658 CG n=535 Male and female adults only Mean age = 42.7 years	SSRIs vs placebo (k=11) [fluvoxamine (k=7), paroxetine (k=2), sertraline (k=1) and escitalopram (k=1)]. OAs vs placebo (k=8), [naltrexone (k=6) and nalmefene (k=2)]. NDRI bupropion vs placebo (k=3). MST vs placebo (k=4) [Sustained-release lithium vs placebo (k=1) topiramate, an anticonvulsant (k=3)]. Atypical antipsychotic vs placebo (k=2) [olanzapine]. **Treatment duration:** 7 to 96 weeks	Reduction in severity of gambling symptoms Gambling behaviours (frequency, time spent gambling)	**SSRIs** were no more effective vs placebo at post-treatment: gambling symptom severity (SMD = –0.32, [95% CI –0.74 - 0.09], n=225). **OAs** showed a medium beneficial effect of treatment on gambling symptom severity at post-treatment (SMD = -0.46, [95% CI: -0.74 - -0.19], n=259). **MSTs** (including anticonvulsants) were no more effective vs placebo at post-treatment: gambling symptom severity (SMD = -0.92, [95% CI: -2.24 - 0.39], n=71). **Atypical antipsychotics:** Medium beneficial effect of treatment on gambling symptom severity relative to placebo at post-treatment (SMD = –0.59, [95% CI: –1.10- –0.08], n=63).	High
Goslar et al. (2018)	NR	Up to 30 April 2018	n=39 (22 RCTs; 17 open-label trials)	1,340 participants with mild mood disorders and anxiety; 864 were assigned to treatment conditions and 476 to CGs. Male (66%) Mean age = 43 years	**No CG** ADs no control (k=8) [bupropion (k=2), escitalopram (k=3), agomelatine (k=1), nefazodone (k=1) and citalopram (k=1)], SSRI (fluvoxamine) no control (k=1). OAs [naltrexone (k=2) and carbamazepine (k=1)], no control (k=3). **Other (k=5)** [acamprosate, N-acetylcysteine, memantine, tolcapone and ecopipam] **CG (k=19)** ADs vs placebo [bupropion and sertraline] (k=2). SSRIs vs placebo	Reduction in gambling severity, frequency	Pharmacological treatments effectively reduce severity and frequency from gambling at short term. Among the placebo-controlled studies, OAs (Hedge's g=1.41, [95% CI: 1.22-0.80]) and MSTs (Hedge's g=1.23, [95% CI: 0.88-1.58]).	Critically low

Author (year)	Date of search	Range (years) of incl. studies	Study design of incl. studies (n)	Population (n) and characteristics	Intervention(s) (n) vs comparison	Outcomes	Results	AMSTAR 2 Quality
					[fluvoxamine and paroxetine] (k=5). OAs vs placebo [nalmefene and naltrexone] (k=6). MSTs vs placebo [topiramate, olanzapine and lithium] (k=5). Other vs placebo [N-acetylcysteine] (k=1). Topiramate vs fluvoxamine Bupropion vs naltrexone Lithium vs valproate **Treatment duration:** 3 to 24 weeks (mean = 11.69)			
Ioannidis et al. (2023)	13 July 2022 to 19 February 2024	1983 to 2023	n=38 (16 used in MA)	977 participants Predominantly male Age range: 29.7 to 51.5 years	AD [bupropion] vs placebo (k=1). SSRI vs placebo [paroxetine and fluvoxamine] (k=3). OA vs placebo [naloxone and nalmefene] (k=5). MST vs placebo [topiramate and olanzapine] (k=4). Other category Antioxidant: silymarin vs placebo (k=1). Naltrexone vs bupropion (k=1).	Reduction in gambling severity	Nalmefene (SMD = -0.86, [95% CI: -1.32 - -0.41]) had a higher efficacy than naltrexone (SMD = -0.42, [95% CI: -0.85 - -0.01]). Nalmefene was more effective vs naloxone in reducing gambling severity (SMD = -1.01, [95% CI: -1.82- -0.20]).	Critically low
Pallesen et al. (2007)	NR	1966 to July 2006	n=16	597 pathological gamblers Mean age = 43.3 years 62.8% of the sample identified as male.	AD vs placebo [bupropion (k=1), paroxetine (k=2) and sertraline (k=1)]. SSRI [fluvoxamine] vs placebo (k=2). OA vs placebo (k=2) [nalmefene (k=1) and naltrexone (k=1)]. MST [lithium carbonate] vs placebo (k=1). AD vs pretreatment (k=3). OA vs pretreatment (k=1). MST vs pretreatment (k=1). Medication vs medication (k=2).	Reduction in gambling behaviours	An overall effect size was 0.78, indicating improvements in post-treatment. No significant differences in outcomes between the three main types of pharmacological interventions (ADs, OAs and MSTs) were observed.	Critically low

Author (year)	Date of search	Range (years) of incl. studies	Study design of incl. studies (n)	Population (n) and characteristics	Intervention(s) (n) vs comparison	Outcomes	Results	AMSTAR 2 Quality
Bartley and Bloch (2013)	NR	2000 to 2011	n=14 RCTs	1,024 participants	OA vs placebo (k=5) [naltrexone (k=3) and nalmefene (k=2)]. AD vs placebo (k=6) [fluvoxamine (k=2), paroxetine (k=2), sertraline (k=1) and bupropion (k=1)]. Antipsychotics vs placebo (k=2) [olanzapine (k=2)]. Other vs placebo (k=1) [topiramate]. **Treatment duration:** 3 weeks to 6 months	Reduction in pathological gambling	OA had a small, significant effect on reducing pathological gambling vs placebo (SMD = 0.22 ± 0.10, [95% CI: 0.03–0.41], z=2.3, p=0.02). Results from other medications were not significant. AD: (SMD = 0.18 ± 0.12, [95% CI: - 0.06– 0.42], z=1.5, p=0.13). Antipsychotic agent: (SMD = 0.23 ± 0.25, [95% CI: -0.27-0.73], z=0.9, p=0.37). Topiramate: (SMD = 0.40 ± 0.31, [95% CI: -0.21–1.01], z=1.3, p=0.20).	Critically low
Psychological Interventions (n=13)								
Cowlishaw et al. (2012)	NR	1997 to 2011	n=14 RCTs	1,245 pathological gamblers Most of the studies were conducted on adults (mean age = 44 years). One examined college student Predominantly male	CBT vs control (k=11); 8 weeks (k=5); 12 sessions (k=1); 6 sessions (k=1); 20 sessions (k=1); 10 sessions (k=1); 6 weeks (k=1); 30 hours (k=1). MI vs control (k=4); 8 weeks (k=1); 1 session (k=1). Integrative therapy vs control (k=2); MET and condensed CBT; 10 minutes to 4 sessions (k=2). Other vs control (k=1); 12-step facilitated group therapy; 8 weeks.	Reduction in gambling severity, frequency	CBT had a very large beneficial effect on gambling symptom severity at 0-3 months (SMD = -1.82; [95% CI: -2.61 - -1.02]) and frequency (SMD = -0.78, [95% CI: -1.11 - -0.45]) vs control. No significant difference between MI vs control in reduction of gambling severity at 0-3 months (SMD = -0.03; [95% CI: -0.55 - -0.50]) and frequency (SMD = - 0.18; [95% CI: -0.50 - -0.15]).	Low
Augner et al. (2022)	NR	Up to July 2022	n=11; six studies in MA 1 (randomised control trials) and five studies in MA 2 (including studies with a pre-post design).	PG and GD TCC: MA 1 n=2051 participants, consisting of n=1034 in the intervention and n=1017 in the CG PPC: n=781 participants	**Online interventions for GD/IGD** **TCC:** Weekly email CBT self-help Email counselling CBT monitoring feedback support **PPC**: ICBT Check Your Gambling (CYG) Self-change tools (SCTs) Approach bias modification (ABM)	IG/GD reduction	Online interventions were effective in both MAs, with Hedge's g=0.41, [95% CI: 0.22 - 0.60], p < .001 for MA 1 and Hedge's g=1.28, [95% CI: 0.85 - 1.71], p < .001 for MA 2.	Critically low

Author (year)	Date of search	Range (years) of incl. studies	Study design of incl. studies (n)	Population (n) and characteristics	Intervention(s) (n) vs comparison	Outcomes	Results	AMSTAR 2 Quality
Eriksen et al. (2023)	3 February 2023	1997 to 2021	n=30 RCTs	n=4848 randomised and 3139 analysed Age range: 20 to 52 years Predominantly male	CBT vs control (k=20): face to face (k=12); self-help (k=4); Internet programme (k=4); text message (k=2). MI vs control (k=5): face to face (k=3); phone (k=1); Internet programme (k=1). Combination of MI + CBT vs control (k=6). Other vs control (k=4): face-to-face CBT (k=1); 12-step facilitation (k=1); face-to-face couple (k=1); monitoring, feedback and support Internet programme (k=1). **Treatment duration:** 4-24 weeks.	Reduction in gambling severity and increase in remission	Interventions delivered face to face were associated with a reduction in gambling severity (Hedge's g=-1.03, [95% CI: -1.54 -0.53], p<0.001) and a small effect on remission (Hedge's g=0.24, [95% CI:0.08 - 0.73], P<0.05). Both individual (Hedge's g=- 0.89, [95% CI: -1.53 - -0.25], p<0.05) and group therapy (Hedge's g=-1.33, [95% CI:-2.18 - -0.47], p<0.05) had reductions in gambling severity and increased remission. CBT was associated with the largest reduction in severity of gambling (Hedge's g=0.85, [95% CI: -1.36 - -0.34], p<0.001). MI did not have any significant effects on the primary outcomes.	Low
Gooding and Tarrier (2009)	NR	1980 to 2008	n=25 RCTs	n=1828 19 out of 25 studies had predominantly male participants.	CBT vs control (k=9): group and individual (k=9); structured (k=1). Imaginal desensitisation vs control (k=3). CBT + other vs control (k=5); MET individual therapy (k=2); MI self-help (k=2); compliance-improving interventions (k=1). Cognitive group therapy vs control (k=5). Other vs control (k=3); individual and group counselling using lectures, film and drama (k=1); node-link mapping (k=2). The mean number of sessions was 17.8, with a mean of 20.8 hours.	Reduction in gambling behaviours	CBT had a large, significant effect on reducing gambling behaviours, which lasted up to 24 months: 0-3 months' follow-up (Hedge's g=-0.72, [95% CI: -0.99-0.44], p=<0.001); six months' follow-up (Hedge's g=-0.65, [95% CI: -1.00 - -0.30], p= <0.0001). Group therapy had more durable effects than individual therapy in the three-month follow-up period.	Critically low

Author (year)	Date of search	Range (years) of incl. studies	Study design of incl. studies (n)	Population (n) and characteristics	Intervention(s) (n) vs comparison	Outcomes	Results	AMSTAR 2 Quality
Goslar et al. (2017)	NR	Up to 30 April 2018	n=27 RCTs	n=3879 participants across all studies were analysed (n= 912 in face-to-face and n=2967 in self-guided treatments); 2655 were assigned to treatment conditions and 1224 to CGs. Predominantly male (60.87%) Mean age = 39 years	CBT vs control (k=13) CBT + MI vs control (k=4) MFS vs control (k=1) MI + PFB vs control (k=4) MI + PNFB vs control (k=4) Toolkit vs control (k=1) PFI vs control (k=1) CCT vs control (k=1) TSF vs control (k=1) EDU vs control (k=1) MI + BA vs control (k=2) MI + MET vs control (k=2) MI + MET + CBT vs control (k=2) The total number of hours spent in face-to-face treatments ranged from 10 minutes to 24 hours (mean = 12.23 hours).	Reduction in global severity and frequency	Face-to-face treatments reduced gambling severity at follow-up, post-treatment (k=16) (Hedge's g=1.15; [95% CI: 0.67 - 1.63, p<0.001), compared to self-guided treatments (Hedge's g=0.30 [95% CI: -0.20-0.63]). Face-to-face treatments reduced gambling frequency at follow-up (Hedge's g=0.67, [95% CI: 0.47-0.87], p<0.001), compared to self-guided treatment (Hedge's g=0.13, [95% CI: 0.05-0.22], p<0.1). CBT was the most supported treatment.	Critically low
Maynard et al. (2018)	NR	January 1980 to April 2014	n=13; seven were RCTs and included in the MA. One was a quasi-experimental design study, two were SGPP studies, and three were single-subject design studies	n=463; 69% were identified as pathological gamblers, and 23% as problematic gamblers. Both male and female participants	Imaginal desensitisation vs control (k=5): 2 sessions (k=1); 12 sessions (k=1); 6 sessions (k=1); 14 sessions (k=2). DBT vs control (k=1); 14 sessions. Mindfulness-enhanced CBT (k=1); 5 sessions.	Reduction in gambling behaviours and urges	Mindfulness-based approaches had medium effects on reducing gambling behaviours (Hedge's g=0.68; [95% CI: 0.39-0.98], p<0.1) and gambling urges (Hedge's g=0.69, [95% CI: = 0.18-1.20], p < .01).	Low
Pallesen et al. (2005)	NR	1968 to 2004	n=22 RCTs	Pathological gambling n=1434 participants Predominantly male (71.5%) Mean age = 40.1 years	**Pre-post trials vs control (k=11):** eclectic therapy (k=6), multimodal therapy (k=1), aversive therapy (k=1), 12-step facilitation (k=1), imaginal desensitisation (k=1), CBT (k=2). **RCT trials vs control (k=11):** individual stimulus control (k=1), CBT + MI (k=1), CBT WB (k=1), CBT (k=6), aversive therapy (k=1), imaginal desensitisation (k=2), imaginal relaxation (k=1), CBT + node-link mapping (k=1).	Reduction in gambling behaviours	Psychological treatments were more effective than no treatment (p= <0.01). At follow-up, the corresponding result was 1.59 (p= <0.01), indicating that interventions are also effective in the long term.	Critically low

Author (year)	Date of search	Range (years) of incl. studies	Study design of incl. studies (n)	Population (n) and characteristics	Intervention(s) (n) vs comparison	Outcomes	Results	AMSTAR 2 Quality
Peter et al. (2019)	March 2016	2001 to 2016	n=11	n=968 College students (n=6) or non-college community samples (n=10)	PFIs Normative feedback vs control (k=6) Personal feedback vs control (k=1) Self-help WB vs control (k=2)	Reduction in gambling behaviours	PFIs had a small but statistically significant positive effect on reduction in gambling behaviours (Cohen's d=0.20, [95% CI: 0.12-0.27]). This intervention was more effective in participants with severe gambling problems. Additional educational information about problematic gambling can be used to enhance intervention effects.	Critically low
Pfund et al. (2023)	July 2022	2007 to 2018	n=9 RCTs	n=658 participants 62% male Mean age = 44 years	CBT vs control (k=8): WB (k=2); group or individual (k=4); Internet (k=2); MI + CBT vs control (k=1).	Reduction in psychological symptoms (anxiety, depression) and gambling behaviours	CB techniques showed a significant reduction in anxiety (Hedge's g=-0.44, [95% CI: -0.70 - -0.18], p<.001) and depression (Hedge's g=-0.35, [95% CI: -0.69 - -0.01], p=.04) at post-treatment. CB techniques did not have a significant effect on reduction in substance use (g=-0.40, [95% CI: -0.82 - -0.03]; p=.07) for those with gambling-related harms.	Low
Pfund et al. (2020)	November 2019	1997 to 2016	n=14 RCTs	PG and GD 19 treatment control comparisons were made of 1203 participants. Mean age = 49.8 (20 to 49) years Predominantly male (M = 60.2) and white (72.8%)	CBT vs control (k=6) MI vs control (k=3) CBT + MI vs control (k=5) CT vs control (k=2) PFI vs control (k=1) Mean treatment sessions received = 6.8	GD reduction	The efficacy of treatment increased as the number offered and received treatment sessions increased.	Critically low

Author (year)	Date of search	Range (years) of incl. studies	Study design of incl. studies (n)	Population (n) and characteristics	Intervention(s) (n) vs comparison	Outcomes	Results	AMSTAR 2 Quality
Yakovenko et al. (2015)	NR	2001 to 2009	n=8 RCTs (5 included in the MA)	Adult disordered gamblers (pathological, problem, or concerned) n=477	MI vs control (k=6): face to face (k=3); phone (k=3); 1 session (k=5); 4 sessions (k=1); 6 sessions (k=1).	Reduction in gambling frequency (mean days gambled per month)	MI had a significant, positive effect on reducing gambling frequency (WMD -1.30 days/ month [95% CI: -2.39 - -0.21], p<0.05). For short-term follow-up of 6 months, MI showed a positive effect on the reduction of gambling frequency (WMD -1.22 days/ month [95% CI: -2.06 - -0.38], p<0.01). Similarly, for long-term effects of 9-12 months, MI had positive effects on reduction in gambling frequency (WMD -1.12 days/month, [95% CI: -2.16 - -0.07], p<0.05).	Low
Quilty et al. (2019)	NR	2008 to 2016	n=7 RCTs	Adolescents and adults (older than 16 years) experiencing gambling problems	MI vs control (k=1) PNFB vs control (k=1) Brief advice vs control (k=3) MET vs control (k=2) Minimal intervention vs control (k=2) All interventions were a single session in duration, from 10 to 90 minutes.	Reduction in gambling problems and gambling behaviours	Brief interventions had significant reductions in short-term gambling behaviours (Hedge's g=-0.19, [95% CI: -0.37- -0.01]). The results of long-term changes in gambling behaviour were not statistically significant (Hedge's g=-0.17, [95% CI:-0.36- 0.04]). Effect estimates for short- and long-term changes in gambling problems were also not significant. There was no significant difference between brief interventions and longer interventions (Hedge's g=0.01, [95% CI:-0.18-0.20]).	Low
Del Mauro et al. (2023)	NR	Up to July 2022	n=10 RCTs (7 included in the MA)	All participants received a diagnosis of pathological gambling or GD. n=159 High prevalence of males (n=140) Age range: 18 to 70 years Mean age = 41.8 years (SD = 4.50)	NiBS vs control (k=7)	Reducing craving scores	The results showed a significant effect of NiBS in reducing craving scores (SMC = −0.69, [95% CI:−1.2, −0.2], p=0.010). These results provide initial evidence for developing NiBS as a feasible therapy for GD symptoms.	Critically low

AD, antidepressant; CB, cognitive behavioural; CG, control group; DBT, dialectical behaviour therapy; EDU, education; EG, experimental group; GD/IGD, gambling disorder/Internet gaming disorder; ICBT, Internet-based cognitive behavioural therapy; MA, meta-analysis; MET, motivational enhancement therapy; MI, motivational interviewing; MST, mood stabiliser; NiBS, non-invasive brain stimulation; NR, not recorded; OA, opiate antagonist; PG, problem gambling; PFI, personalised feedback intervention; PNFB, personalised normative feedback; PPC, pre-post comparison; *RCT, randomised control trial; SD, standard deviation; SGPP, single-group pre-post test; SMC, standardised mean change; SMD, standardised mean difference; SSRI, selective serotonin reuptake inhibitor; TCC, treatment control comparison; WB, workbook; WMD, weighted mean difference.

3.3.5 Psychological interventions

Thirteen reviews, including 90 primary research studies, evaluated the effectiveness of psychological interventions in treating gambling addiction. Fifty-one of these primary studies were reported in at least two reviews (56.7% overlap). Various psychological interventions (single or combined) were evaluated, including cognitive behavioural therapy (CBT), motivational interviewing (MI) interventions, brief interventions, personalised feedback interventions (PFIs), self-help, mutual support, and Internet-delivered therapies. Although all psychological interventions combined were associated with reduced gambling symptoms (Pallesen et al., 2005), the majority of interventions evaluated in the primary studies were based on CBT and MI.

Eriksen et al. (2023) assessed the effectiveness of various psychological interventions – including CBT, MI, and a combination of CBT and MI – in reducing gambling symptom severity and promoting gambling disorder remission. The findings showed that CBT was associated with the largest reduction in gambling severity (Hedge's g=-0.85, [95% CI: -1.36 to -0.34], p=<0.001), while MI alone yielded non-significant results. However, this non-significant finding conflicts with results from a systematic review by Yakovenko et al. (2015), which found MI to be effective in reducing gambling frequency at all time points up to a 12-month follow-up. However, the quality of both these reviews was rated low.

Eriksen et al. (2023) also highlighted that, while a significant moderate effect was observed when pooling 13 studies on remotely delivered interventions, face-to-face interventions were associated with a larger effect, resulting in greater reductions in gambling severity (Hedge's g=-1.03, [95% CI: -1.54 to 0.53], p<0.001) and a small effect on remission (Hedge's g=0.24, [95% CI: 0.08 to 0.73], p<0.05). Both individual (Hedge's g= -0.89, [95% CI: -1.53 to -0.25], p <0.05) and group (Hedge's g= -1.33, [95% CI: -2.18 to -0.47], p<0.05) therapies were effective in reducing gambling symptom severity.

Supporting the delivery of online psychological interventions, Augner et al. (2022) conducted two separate meta-analyses (based on study design) to investigate the effectiveness of online interventions for treating problem gambling (six studies were included in meta-analysis 1, and five studies were included in meta-analysis 2). Both meta-analyses revealed that online interventions have medium and significant effects on treating problem gambling (Hedge's g=0.41, [95% CI: 0.22 to 0.60], p<.001 for meta-analysis 1, and Hedge's g=1.28, [95% CI: 0.85 to 1.71], p<.001) for meta-analysis 2). Therefore, individuals participating in psychotherapeutic treatment online showed significant, positive effects of delivering interventions remotely.

Goslar et al. (2017) also compared face-to-face to self-guided therapy and found significantly higher effect sizes for face-to-face treatments (FTFTs) (16 studies, with Hedge's g ranging from 0.67 to 1.15), compared to self-guided treatments (11 studies, with Hedge's g ranging from 0.12 to 0.30), in reducing gambling frequency and global symptom severity at three months (Table 4). Among FTFTs, most studies implemented CBT and combined CBT strategies, delivered through individual and group settings. The quality of this review was rated critically low.

Cowlishaw et al. (2012) conducted a Cochrane systematic review, including 14 trials, to synthesise evidence on psychological therapies for pathological and problem gambling (CBT, MI therapy, integrative therapy, and other psychological therapy). Of these, 11 studies assessed forms of CBT, with seven comparing CBT to a control group on gambling symptom severity. The results indicated a significant and very large beneficial effect at zero to three (0-3) months post-treatment (SMD = -1.82, [95% CI: -2.61 to -1.02], p<0.001, n=402). However, according to the review authors, the precise magnitude of the summary effect (Table 4) should be interpreted with caution, given the high-level statistical heterogeneity across the primary studies. Seven of the 11 studies compared CBT to a control group on gambling frequency. The results indicated a significant

difference between groups at 0-3 months, post-treatment, showing a large beneficial effect of CBT on reducing gambling frequency (SMD -0.78, [95% CI: -1.11 to -0.45]). Two of the four studies in this review also compared MI therapy to a control group on gambling symptom severity. The results indicated that the difference between groups at 0-3 months post-treatment was not significant and approached zero. For gambling frequency, the results indicated that the difference between groups at 0-3 months post-treatment was also not significant, but showed a small effect (SMD = -0.18, [95% CI: -0.50 to 0.15]). The results for all other interventions indicated that the difference between groups at 0-3 months post-treatment was not significant. This review was rated as being of low quality.

Even though their review has not been updated since 2012, Gooding and Tarrier (2009) also found a significant and medium effect of CBT in reducing gambling behaviours within the first three months of therapy cessation (Hedge's g=-0.72 [95% CI: -0.99 to -0.44], p <0.001). The results indicated that effect sizes were also significant at the six-, 12- and 24-month follow-up periods. The results of a subgroup analysis suggested that both individual (Hedge's g=-0.69, [95% CI: -1.02 to -0.35], p<0.001) and group (Hedge's g=-0.63, [95% CI: -1.03 to -0.22], p<0.01) therapies were equally as effective in the three-month time window, however, this equivalence was not clear at follow-up. The quality of this review was rated critically low.

In terms of other psychological interventions, Maynard et al. (2018) examined the effectiveness of mindfulness-based interventions on gambling behaviour symptoms (six studies) and urges (four studies). While all studies in the review included a mindfulness component, there was considerable variability in intervention characteristics. Several studies combined mindfulness with other approaches, such as behavioural interventions, cognitive interventions, and various counselling interventions. The results indicate a moderate and significant effect on gambling symptoms (Hedge's g=0.68, [95% CI: 0.39 to 0.98], p<.01) and gambling urges (Hedge's g=0.69, [95% CI: 0.18 to 1.20], p<.01). The quality of this review was rated low.

Quilty et al. (2019) evaluated the efficacy of in-person brief interventions for reducing gambling behaviours and/or problems. The brief interventions were defined as in-person individual psychosocial interventions of brief duration (</=three sessions). All interventions were a single session, ranging in duration from ten to 90 minutes, and included a range of components, such as personalised feedback, psychoeducation, goal-setting, and advice or recommendations. The results found that brief interventions were associated with small but significant reductions in short-term gambling behaviour versus assessment-only control (Hedge's g=-0.19, SE=0.09, [95% CI: -0.37 to -0.01]).

Peter et al. (2019) evaluated personalised feedback interventions (PFIs), in terms of content, mode of delivery, and efficacy. The results found that PFIs had a small but statistically significant, positive effect on reduction in gambling behaviours (Cohen's d=0.20, [95% CI: 0.12 to 0.27]). These interventions appeared to be most efficacious when used in populations of greater gambling severity, when individuals were provided with gambling-related educational information, and when used in conjunction with MI. Factors associated with reduced efficacy include in-person delivery of feedback without MI.

In addition to the pharmacological and psychological interventions described herein, one systematic review evaluated the effectiveness of non-invasive brain stimulation (NiBS) in treating gambling disorder (Del Mauro et al., 2023). The results showed the significant effect of NiBS in reducing craving scores (SMC = -0.69, [95% CI: -1.2 to -0.2], p=<0.01). The quality of this review was critically low.

3.3.6 Methodological quality of included reviews

The methodological quality of included reviews was assessed using the AMSTAR 2 tool (Shea et al., 2017). As highlighted in Section 2.6.2, we identified eight critical domains that undermined the overall confidence in the evidence reported in the review. Only one review was graded as having a high methodological quality, six rated as having a low methodological quality, and eleven rated as having a critically low methodological quality. A full description of the AMSTAR 2 16-item assessment for each systematic review is provided in Appendix 5.

3.3.7 Summary of findings

This summary highlights the findings from an umbrella review of 18 systematic reviews and meta-analyses for treating gambling addiction. Five systematic reviews evaluated the effectiveness of pharmacological interventions for treating gambling addiction. The primary studies within these reviews examined various categories of medications, such as antidepressants, opioid antagonists, mood stabilisers, anticonvulsants (topiramate), and atypical antipsychotics.

Although the reviews suggest a generally positive effect from pharmacological treatments for gambling addiction, the overall conclusions of the reviews were mixed, with opioid antagonists (nalmefene, naltrexone) showing preliminary support, while conflicting results were reported for olanzapine, an atypical antipsychotic. Of the five included reviews, only one review was rated as being of high quality.

Thirteen systematic reviews evaluated psychological interventions for treating gambling addiction. Although various psychological interventions (single or combined) were evaluated, most interventions evaluated in the primary studies were based on CBT and MI. Other psychological interventions evaluated included brief interventions, personalised feedback interventions (PFIs), self-help, mutual support, and Internet-delivered therapies. CBT alone, or in combination with MI, appeared to be promising in treating gambling severity and symptoms. However, there were variations across the individual systematic reviews, in the mode of delivery, length of treatment sessions, and the duration of treatment.

The evidence from the primary studies included in each of the 18 systematic reviews remains weak. The heterogeneity of the included studies – in relation to study designs, intervention characteristics, and screening and diagnostic tools – was evident, and this limits the ability to draw definite conclusions. These variations may have contributed to the differences in the magnitude of the summary effect observed across the reviews. The weak methodological quality of the included systematic reviews also limits the overall confidence in the findings. Therefore, the results should be interpreted with caution, due to the methodological weaknesses.

3.4 Treatment of gambling addiction for individuals with comorbid mental health conditions, other addictions, and marginalised groups

3.4.1 Introduction

The complex relationship between gambling disorder and various comorbid conditions, including mental health issues, other addictions, and socioeconomic challenges, such as homelessness, necessitates a comprehensive approach to understanding and addressing these multifaceted needs. Gambling addiction often co-occurs with psychiatric disorders like depression, anxiety, post-traumatic stress disorder (PTSD), schizophrenia, and bipolar disorder, as well as addictions to alcohol, substances and tobacco. These comorbidities can exacerbate the severity of gambling problems and complicate treatment outcomes, while socioeconomic factors like homelessness further compound the issue.

This narrative synthesis examines findings from multiple primary research studies, including 13 on comorbid mental health conditions, ten on other addictions, and two on homelessness. It explores the effectiveness of treatment modalities such as CBT, MI, and integrated therapeutic approaches. By examining these relationships, the synthesis aims to identify effective strategies, ultimately informing the development of more comprehensive and effective treatment strategies for individuals affected by gambling addiction and its associated challenges.

3.4.2 Gambling and comorbid mental health conditions

The relationship between gambling addiction and comorbid mental health conditions is multifaceted. This section of the review synthesises findings from four systematic reviews included in the umbrella review (Section 3.3) and an additional 13 primary research studies that explore this complex interplay. It covers gambling addiction and general comorbidity (Champine and Petry, 2010; Kruse-Diehr et al., 2022; Rodda et al., 2017), as well as specific comorbidities, including PTSD (Najavits, 2011; Najavits et al., 2013; Najavits et al., 2023), depression (Linnet et al., 2017; Ranta et al., 2019), and the combined impact of depression and anxiety (Cunningham et al., 2019). Additionally, it explores the associations between gambling and schizophrenia (Echeburúa et al., 2011; Echeburúa et al., 2017), bipolar disorder (Hollander et al., 2005) and suicidal behaviour (Valenciano-Mendoza et al., 2021).

Champine and Petry (2010) examined the effectiveness of CBT for pathological gamblers with various mental health treatments. The study involved 231 treatment-seeking pathological gamblers from Connecticut, in the USA, randomly assigned to one of three interventions: Gamblers Anonymous (GA) alone (n=63), GA plus a CBT workbook (n=83), or GA plus individual CBT sessions (n=84). The rates of GA participation did not differ across the three treatment conditions, with 37.3%, 44.0% and 32.5% of those assigned to GA alone, GA plus a CBT workbook, and GA plus CBT individual therapy, respectively. Although reductions were observed across all interventions, the results demonstrated that individual CBT significantly reduced gambling problems across all groups, irrespective of their psychiatric history ($p<0.001$). The high prevalence of comorbid psychiatric disorders – including mood, anxiety and personality disorders – was noted, with those currently receiving mental health treatment exhibiting the most severe psychiatric issues. Notably, the intervention's effectiveness was consistent, regardless of the severity of these comorbid conditions.

Kruse-Diehr et al. (2022) conducted a longitudinal study on the Ohio Problem Gambling Treatment Model (OhPGTM) for adults with co-occurring disorders. The study included 353 participants, with 122 completing the 12-week programme. The intervention incorporated CBT, MI, the stages of change, and life skills training. The results indicated a significant reduction in gambling disorder symptom severity, even after controlling for covariates. However, changes in self-esteem and gambling urges were not significant after adjustments. The study noted high rates of comorbid mental health conditions, such as depression (64%), anxiety (62%), and substance use disorder (66%), among participants.

Rodda et al. (2018) conducted an exploratory qualitative study examining barriers and facilitators to screening for problem gambling in Australian mental health services. The sample included 30 clinicians and managers from various mental health services in Victoria, Australia. The study highlighted the importance of routine screening for problem gambling and the need for brief screening tools integrated into standard assessments. It found that routine screening was crucial for identifying gambling problems, which are often overlooked. The study also emphasised the significant impact of gambling on the treatment of other mental health conditions, with mood and substance use disorders commonly associated with gambling problems.

3.4.1.1 Gambling and PTSD

Najavits (2011) investigated treatment preferences among 106 individuals with PTSD, pathological gambling, or both. The study evaluated 16 treatment modalities, including manualised psychotherapies, medication, self-help, alternative therapies, coaching, and self-guided treatments. The findings revealed that PTSD treatments were consistently rated more highly than pathological gambling treatments, even among those participants with both disorders. Individual therapy and Seeking Safety (SS) were preferred for PTSD, whereas self-help was the highest rated for pathological gamblers. Comorbid conditions – such as substance use disorder, mood disorders, and personality disorders – were prevalent, with PTSD often underdiagnosed and undertreated, compared to other conditions.

Najavits et al. (2013) conducted a pilot outcome study evaluating SS therapy for seven outpatients with comorbid pathological gambling and PTSD. The intervention involved weekly individual sessions of SS therapy, a CBT focusing on psychoeducation and coping skills across 25 topics. The study observed significant improvements in PTSD symptoms, gambling behaviours, functioning, psychopathology, self-compassion, and therapeutic alliance, indicating the therapy's effectiveness. The onset of PTSD typically preceded pathological gambling for most participants in this study. Overall, SS therapy demonstrated high acceptability and positive outcomes for treating comorbid PTSD and pathological gamblers.

Najavits et al. (2023) compared the efficacy of SS to that of CBT among 65 adults with comorbid gambling disorder and PTSD. Participants were treated via telehealth over three months, with follow-ups at post-treatment and 12 months. Both interventions resulted in significant improvements in gambling behaviour, PTSD symptoms, and coping skills, with no significant differences between the treatments, except for a higher session attendance in SS. The findings suggest that SS and CBT are effective for comorbid conditions, with SS showing promise in enhancing engagement, due to its integrated approach. This study highlights the importance of flexible, integrated treatments for populations with complex needs.

3.4.1.2 Gambling, Depression and Anxiety

Four reviews synthesised in the umbrella review also reported on the effectiveness of interventions for individuals with comorbid mental health conditions associated with gambling disorder (Dowling et al., 2022; Del Mauro et al., 2023; Eriksen et al., 2023; Pfund et al., 2023). Each of these reviews provides insights into how various treatments impact both gambling disorder and related mental health comorbidities for participants, with the latter being secondary outcomes.

Eriksen et al. (2023) explored the effects of psychological interventions for gambling disorder on the secondary outcomes of depressive symptoms and anxiety. The results revealed a significant positive medium effect, with a reduction in depressive symptoms (Hedge's g=-0.46, [95% CI: -0.77 to -0.15], p=<0.05) and anxiety levels (Hedge's g=-0.56, [95% CI: -0.78 to -0.35], p=<0.001) at post-treatment.

Pfund et al. (2023) investigated the effectiveness of cognitive behavioural (CB) techniques in reducing anxiety and depression and improving quality of life among problem gamblers. The results also demonstrated a significant reduction in anxiety (Hedge's g=-0.44, [95% CI: -0.70 to -0.18], p<0.001) and depression (Hedge's g=-0.35, [95% CI: -0.69 to -0.01], p=<0.05) at post-treatment. The meta-analysis also revealed that CB techniques significantly increased quality of life (Hedge's g=0.40) at post-treatment. Previously, Pfund et al. (2023) found that these CB techniques had a positive effect on reducing gambling symptoms and behaviours at post-treatment.

Del Mauro et al. (2023) conducted an exploratory analysis of the effects of NiBS on depressive symptoms for patients with gambling disorder. The findings of the analysis revealed significant reductions in depressive symptoms in post-treatment scores (SMC = -0.71, [95% CI: -1.1 to -0.3], p<0.001). However, according to the review authors, further research is needed to validate these findings, as well as finding that NiBS is effective in gambling disorder reduction (Table 4).

Dowling et al. (2022) conducted a meta-analysis on pharmacological interventions, revealing mixed results in the effects of interventions on the reduction of depressive and anxiety symptoms. At the end of the treatment, no clear differences were found between antidepressants and mood stabilisers, and no treatment regarding their effectiveness in the reduction of depressive and anxiety symptoms. Although antidepressants were found to be no more effective than placebos on depressive symptoms (secondary outcome), with small beneficial effects, the very low to low certainty of this evidence precludes definitive conclusions about the degree to which antidepressants can improve these outcomes. These findings relating to antidepressants versus placebos should be interpreted cautiously, given other important features and limitations of the evidence. The individual trials were small and supported only a modest pooled sample of participants. In relation to gambling symptoms, all of the pharmacological interventions included showed to have low to medium beneficial effects in the reduction of gambling symptoms' severity, showing that they are no more effective than placebos at post-treatment (Table 4). As such, this comparison may have lacked the power to detect modest effects of the pharmacological intervention(s). There was significant heterogeneity of the included studies in relation to study designs, intervention characteristics, and screening and diagnostic tools, and this limits the ability to draw definite conclusions.

Cunningham et al. (2019) conducted an RCT to evaluate the efficacy of an online intervention for problem gambling, with or without an additional mental health component, among 283 participants. The sample was divided into two groups: one receiving only the gambling intervention, and the other receiving both the gambling intervention and the MoodGym mental health programme. Both groups showed significant reductions in gambling severity and frequency over time, however, the addition of the mental health

intervention did not enhance these outcomes. Co-occurring mental health conditions, such as depression and anxiety, also improved significantly in both groups, yet the combined intervention did not offer additional benefits. Despite access to MoodGym, its utilisation was low, possibly explaining the lack of additional benefits from the combined intervention. The study highlights the potential of online interventions to reduce gambling problems and associated mental health symptoms, but suggests that additional mental health components may not enhance these outcomes.

3.4.1.3 Gambling and Suicidal Behaviour

Valenciano-Mendoza et al. (2021) examined the impact of a CBT intervention on 1,112 patients with gambling disorder (229 reported suicidal ideation and 74 reported suicide attempts) at Bellvitge University Hospital, in Barcelona, Spain. The intervention consisted of 16 weekly group CBT sessions. The results showed that 25.2% of patients relapsed and 26.0% dropped out during the treatment. The likelihood of suicide attempts increased for patients who reported non-strategic gambling (where knowledge and skill are less necessary to participate in the game) ($p<0.05$), were female ($p<0.001$), were not married ($p<0.05$), and did not receive family support ($p<0.05$). Suicidal ideation and attempts were associated with higher gambling disorder severity ($p<0.05$). Women (30.8%) and individuals lacking family support (78.9%) experienced higher relapse and dropout rates, and this result was statistically significant. Dropout was considered when the patient missed two or more CBT sessions in a row, without returning to later sessions. Comorbid mental health conditions, such as depression and anxiety, were prevalent among patients with suicidal ideation and attempts, contributing to poorer treatment outcomes for those participants.

3.4.1.4 Gambling and Schizophrenia

Echeburúa et al. (2011) conducted a pilot study to test the effectiveness of a CBT programme adapted explicitly for pathological gamblers with chronic schizophrenia. The intervention combined standard drug therapy for schizophrenia with a CBT programme focusing on psychoeducation, stimulus control, gradual exposure, and relapse prevention. The study found that 73.9% of the experimental group achieved therapeutic success at the three-month follow-up – significantly higher than the 19% success rate in the control group. The intervention was effective in reducing gambling episodes, however, the improvements were less pronounced at the six- and 12-month follow-ups, highlighting the need for sustained support. Overall, the findings suggest that CBT can be a beneficial therapy for individuals with a dual diagnosis of gambling disorder and schizophrenia, though long-term support is essential to maintain gains. The value of tailoring the programme cannot be conclusively ascertained.

Echeburúa (2017) studied 35 patients with chronic schizophrenia and gambling disorder, treated with CBT combined with standard pharmacological treatment. The CBT intervention included 26 weekly sessions focusing on psychoeducation, stimulus control, gradual *in vivo* exposure with response prevention, and relapse prevention. The therapeutic failure rate during treatment was 43%, and the relapse rate during follow-up was 32%. Failures were linked to a higher number of schizophrenia episodes, the age of gambling onset, and the age of the patients. Relapses were associated with younger age. The findings emphasise the challenges in treating gambling disorder among individuals with chronic schizophrenia and suggest that more intensive and tailored interventions are necessary to address this complex dual diagnosis.

3.4.1.5 Gambling and Bipolar Disorder

Hollander et al. (2005) investigated the efficacy of sustained-release lithium carbonate in reducing impulsive gambling and affective instability in pathological gamblers with bipolar spectrum disorder. The study included 40 adult pathological gamblers with bipolar spectrum disorder, recruited through advertisements. The intervention was a ten-week randomised, double-blind, placebo-controlled trial comparing sustained-release lithium carbonate to a placebo. The results indicated that sustained-release lithium significantly mitigated gambling severity ($F=18.69$, $df=1, 28$, $p<0.001$) and reduced affective instability ($F=4.82$, $df=1, 28$, $p<0.05$), compared to the placebo, by the end of the treatment (Week 10). Comorbid mental health conditions – including substance abuse, OCD, anxiety, ADHD and mood disorders – were prevalent among participants.

3.4.3 Gambling and other addictions

This section synthesises findings from nine studies exploring these multifaceted interactions. It covers three specific areas: gambling and alcohol use (Cunningham et al., 2020; Jiménez- Lee et al., 2023; Josephson et al., 2016; Murcia et al., 2016; Stinchfield, 2005; Toneatto et al., 2009); gambling and substance use, including methadone maintenance treatment (Baxley et al., 2021; Petry et al., 2016; Wieczorek and Dąbrowska, 2020); and gambling and tobacco use (Bui et al., 2023).

3.4.3.1 Gambling and Alcohol Use

Lee et al. (2023) conducted an RCT to evaluate the effectiveness of congruence couple therapy (CCT) in treating alcohol use and gambling disorder with psychiatric comorbidities. The sample included 46 primary clients and their partners (n=92) from Canadian outpatient addiction clinics. The CCT intervention was compared to individual-based treatment-as-usual (TAU). The results showed that CCT significantly improved primary outcomes, including alcohol use, problem gambling, psychiatric symptoms, and couple adjustment, with medium to large effect sizes (Cohen's $z=0.74$-1.44; $p<0.05$). Secondary outcomes, such as emotion regulation, substance use, depression, PTSD and life stress, also improved more in the CCT group than in TAU (Cohen's $z=0.27$-1.53; $p<0.001$). The study noted a high prevalence of comorbid mental health conditions, with significant concurrent symptomatic alcohol use and depression (80%) and PTSD (40%). Additionally, CCT effectively reduced life stress and substance use, potentially addressing issues related to homelessness and other addictions.

Cunningham et al. (2020) conducted an RCT to assess the effectiveness of online interventions for problem gamblers with and without unhealthy alcohol use. The study involved 282 participants recruited across Canada. Participants were randomly assigned to either an online gambling intervention alone (G only) or combined with a brief personalised feedback intervention for unhealthy alcohol use (G+A). Both groups showed significant reductions in gambling severity over time, however, there were no significant differences between the interventions. Additionally, no significant reductions in alcohol consumption were observed among participants with unhealthy alcohol use, regardless of the intervention. These findings indicate that while online interventions can mitigate gambling severity, adding a brief alcohol intervention does not necessarily improve outcomes for gambling or alcohol use.

Jiménez-Murcia et al. (2016) examined the effects of CBT on male patients with gambling disorder and its association with their alcohol consumption. The study included 111 male patients with a mean age of 45 years, treated at the Pathological Gambling Unit of Bellvitge University Hospital, in Barcelona, Spain. This unit is certified as a tertiary centre for treating gambling disorder and oversees complex cases. The intervention involved 16 weekly group CBT sessions, each lasting 90 minutes, with a follow-up period lasting up to two years. Family members, typically spouses or partners, were involved in the treatment, to help support the patients and manage risk situations. They attended seven of the 16 weekly treatment sessions and the entire follow-up period. The results indicated that CBT effectively reduced gambling behaviours and emotional distress. However, patients with high alcohol consumption had poorer treatment outcomes, including higher rates of poor attendance, poor compliance, relapses and dropouts, with a significant association of moderate effect size. High levels of somatisation and emotional distress were more prevalent in patients with high alcohol consumption. These patients also tended to have lower socio-economic statuses, indicated by low household incomes and high debts.

Josephson et al. (2016) explored the impact of motivational interviewing (MI) and cognitive behavioural group therapy (CBGT) on individuals with gambling disorder, focusing on those with comorbid risky alcohol habits. The study involved 53 participants from an outpatient dependency clinic in Stockholm, Sweden. Participants underwent screening for gambling disorder and risky alcohol habits using the National Opinion Research Center DSM Screen for gambling problems and the Alcohol Use Disorders Identification Test (AUDIT). They were then assigned to either MI (four 50-minute individual sessions) or CBGT (eight three-hour group sessions). The findings revealed that participants with gambling disorder and risky alcohol habits benefitted more from MI, showing significant reductions in gambling behaviours, compared to those receiving CBGT. Conversely, those without risky alcohol habits showed better outcomes with CBGT. This study highlights the importance of considering comorbid conditions, such as risky alcohol habits, when selecting treatment modalities for gambling disorder, to enhance adherence and reduce relapse rates.

Stinchfield (2005) investigated the effects of current alcohol use and prior substance abuse treatment on treatment outcomes for pathological gambling. The sample included 765 participants from six outpatient gambling treatment programmes in Minnesota, in the USA. The intervention involved outpatient group therapy focusing on abstinence from gambling, education, structured therapy, financial counselling, and family support over approximately two months, with an average of 26 sessions. There were no statistically significant differences between patients with and without past alcohol treatment on gambling frequency.

Toneatto et al. (2009) explored the efficacy of naltrexone combined with cognitive behavioural counselling for treating concurrent alcohol use disorder and pathological gambling. The study involved 52 subjects, predominantly male (93%), with an average age of 40 years. The participants received 11 weeks of medication (naltrexone (n=25) or placebo (n=27)) alongside seven sessions of CBT. The results revealed that the frequency of gambling was significantly lower at the end of treatment, compared to the baseline ($F=13.44$, $df=1, 50$, $p<.001$), but not between the end of treatment and the one-year follow-up ($F=0.09$, $df=1, 50$, $p<.001$). Seventy per cent (70%) of the sample reported 100% compliance with the medication regimen. Most of the sample (63% of naltrexone; 80% of placebo) reported no adverse events at all. The most common adverse events reported were nausea/vomiting (14.8%, naltrexone; 4%, placebo), fatigue (14.8%, naltrexone; 0%, placebo), headaches/pains (7.4%, naltrexone; 8%, placebo) and dry mouth (7.4%, naltrexone; 4%, placebo).

Wieczorek and Dąbrowska (2020) investigated the difficulties in treating individuals with comorbid gambling and substance use disorders (alcohol and drug misuse), using a sample of 65 respondents, including

patients and treatment professionals. Predominantly middle-aged males with a history of both gambling and substance use disorders participated. The intervention primarily involved CBT, motivational interviewing, and integrative therapy, combining various modalities. The study found that individuals with comorbid disorders had worse treatment outcomes, higher relapse rates, and more severe symptoms, compared to those with a single disorder. Comorbid mental health conditions, such as anxiety, depression, and poor impulse control, were prevalent, complicating treatment.

3.4.3.2 Gambling and Substance Use (Methadone)

Baxley et al. (2021) examined the impact of three brief gambling interventions on 109 patients with problem gambling and a history of methadone maintenance treatment (MMT). The interventions included brief psychoeducation (BP) that provided broad information on gambling, brief advice (BA) that delivered personalised feedback and recommendations for reducing risky gambling behaviours, and motivational enhancement therapy (MET) plus CBT (MET+CBT). All three interventions significantly reduced gambling behaviours and gambling problems over time. When the interventions were compared, BA led to greater reductions in the number of days gambled, compared to BP. Further, MET+CBT led to greater reductions in gambling problems, alcohol use, and alcohol problems over time, in comparison to BA. Psychological problems and distress decreased over time for the entire sample, especially for men and those with severe opioid dependence. Employment problems persisted, indicating a need for targeted occupational interventions.

Petry et al. (2016) conducted an RCT to evaluate brief gambling treatments among 217 substance abuse treatment patients with gambling problems. Participants were recruited from outpatient methadone and psychosocial clinics and received either a BP session (n=69), BA (n=66), or a four-session MET+CBT programme (n=82). The results indicated that BA significantly reduced days gambled, compared to BP, between baseline and Month 5. However, there was no difference in SOGS scores between BP and BA interventions in the short term (up to Month 5). MET+CBT led to greater reductions in gambling problems, both in the short term (up to Month 5) and long term (up to Month 24), with the most significant improvements observed in the first five months. The study also highlighted that MET+CBT initially decreased self-reported alcohol use more significantly than BA up to Month 5, but this effect did not persist beyond then. MET+CBT did not significantly impact self-reported illicit drug use problems. The submission of positive drug samples did not significantly change between the different intervention groups over time, however, the likelihood of submitting drug-positive samples increased, suggesting potential discrepancies between self-reported and objective measures of substance use. The odds of testing positive did not change between Month 5 and Month 24, and interactions by time and treatment conditions were non-significant. At baseline, Month 5 and Month 24, the predicted probabilities of testing positive were 0.3, 0.5 and 0.4 for BP, 0.3, 0.6 and 0.5 for BA, and 0.2, 0.4 and 0.3 for MET+CBT. No study-related adverse events occurred. Participants with greater employment problems were more likely to show clinically significant reductions in gambling in the short term.

3.4.3.3 Gambling and Tobacco Use

Bui et al. (2023) conducted an RCT to examine the efficacy of a novel online integrated treatment for problem gambling and tobacco-smoking. The study involved 209 North American adults (mean age = 37.6 years, SD = 13.81, 62.2% female). Participants were randomised into an integrated treatment group (addressing both gambling and smoking) or a gambling-only treatment group. The integrated intervention included

CBT, motivational interviewing, and nicotine replacement therapy over eight weeks. The results indicated significant reductions in gambling and smoking behaviours in both groups, with no significant differences between them. Reductions in smoking and gambling cravings were correlated with reduced gambling days and symptoms, and higher nicotine replacement therapy use was linked to greater reductions in gambling behaviours.

3.4.3.4 Gambling and marginalised groups

This section synthesises findings from just two studies exploring the impact of problem gambling on self-management strategies among individuals experiencing poverty and homelessness (Matheson et al., 2021; Vandenberg et al., 2022). These studies provide insights into the socio-economic challenges and comorbid conditions faced by individuals dealing with both gambling problems and homelessness, emphasising the need for holistic interventions that address broader contextual factors.

Matheson et al. (2021) undertook a qualitative study to examine self-management strategies for problem gambling among individuals experiencing poverty and homelessness. The sample consisted of 19 adults, including ten males and nine females, aged 40 to 79 years. The study evaluated self-management strategies, such as seeking information, discussing gambling issues, limiting gambling expenditures, avoiding gambling venues, and engaging in alternative activities. The effects of these interventions were contextually influenced by participants' socio-economic and health challenges, often exacerbating their difficulties, rather than alleviating them. Comorbid mental health conditions, substance use, and physical health issues were prevalent among participants. Marginalised groups – including those with complex vulnerabilities, such as homelessness and poverty – faced unique barriers to managing gambling problems. The study found that self-management strategies helped participants develop self-awareness and confront many barriers, including gambling addiction and financial and housing matters.

Vandenberg et al. (2022) explored the complex relationship between gambling and homelessness among older adults in Victoria, Australia, using qualitative methods. The study involved 48 key informants who worked with older adults (aged 50+ years) experiencing gambling-related harms and homelessness. It was found that gambling and homelessness are reflexively interconnected, with gambling often serving as a coping mechanism for the adverse impacts of homelessness on mental and material well-being. This relationship was further complicated by comorbid conditions such as substance use, depression, and past trauma, which often triggered gambling. Although the study did not specify distinct impacts on marginalised groups like ethnic minorities or LGBTQ+ individuals, it highlighted the significant impact on older homeless adults as a marginalised population. Gambling exacerbated homelessness and other addictions, creating a complex web of interconnected issues that made interventions challenging.

3.4.4 Summary of findings

This summary of findings examines the treatment of gambling addiction among patients with comorbid mental health conditions, other addictions, and those from marginalised groups. Of the 13 studies identified for comorbid mental health, six evaluated treatments for patients diagnosed with depression, or both depression and anxiety, three focused on PTSD, two on schizophrenia, one on bipolar disorder, and one on patients with suicidal thoughts.

Significant variations were noted across the studies, in terms of design, diagnostic tools, outcome measures,

and intervention duration. Despite these variations, CBT emerged as the most widely studied and effective intervention for treating patients with gambling disorder in combination with anxiety, depression, schizophrenia, PTSD and suicidal ideation. Additionally, Seeking Safety was also found to be effective for patients with PTSD. Outcome and relapse rates were influenced by several variables, including patients' co-occuring mental health conditions and demographic variables.

Although results from a meta-analysis on pharmacological interventions (Dowling et al., 2022) revealed mixed results on the reduction of depressive and anxiety symptoms, these findings relating to antidepressants versus placebos should be interpreted cautiously, given other important features and limitations of the evidence. The individual trials were small and supported only a modest pooled sample of participants. As such, this comparison may have lacked the power to detect modest effects of the pharmacological intervention(s). There was significant heterogeneity of the included studies in relation to study designs, intervention characteristics, and screening and diagnostic tools, and this limits the ability to draw definite conclusions.

Among the nine primary studies evaluating treatments for gambling disorder in patients with other addictions, various interventions specifically targeting both gambling and alcohol addiction were assessed. These studies also exhibited differences in study design and outcome measures, with small sample sizes. The interventions evaluated included CCT, brief personalised feedback, CBT, naltrexone combined with CBT, and MI.

CCT was the only intervention reported to be effective in reducing both gambling and alcohol use. While CBT was effective in reducing gambling behaviours, it did not lead to reductions in alcohol consumption and was associated with poorer outcomes, including higher dropout rates and lower compliance overall. MI was found to be effective in one study, but the small sample size limits its generalisability, and no significant differences were observed in group therapy. One study evaluating the combination of naltrexone and CBT showed significant short-term improvements, though these benefits were not sustained at the one-year follow-up.

Two studies examined treatments for gambling disorder in patients attending methadone maintenance treatment programmes. Of the brief psychological interventions evaluated, the combination of CBT and MET resulted in the greatest reduction in both gambling problems and alcohol use. Additionally, two qualitative studies explored the impact of self-management strategies on treating gambling disorder among individuals experiencing homelessness and poverty. These studies emphasised that gambling and homelessness are interconnected, with gambling frequently serving as a coping mechanism for the mental health challenges caused by homelessness.

3.5 Evaluation of effective interventions for treating gambling addiction

3.5.1 Introduction

The following section reviews evaluation studies examining the feasibility, acceptability and engagement of the effective interventions identified in Section 3.3 and Section 3.4 for treating gambling disorder. The primary focus includes cognitive and behavioural therapies, Internet-based and technology-delivered interventions, non-invasive brain stimulation, pharmacological treatments, group and support-based interventions, and personalised feedback strategies. Additionally, it highlights the facilitators and barriers influencing the successful implementation of these interventions, where evidence is available.

During the full-text screening stage, 180 full-text articles that were deemed to potentially provide evaluative evidence about implementation (covering acceptability, feasibility, engagement, etc.) were identified. This was identified as important to supplementing the effectiveness evidence previously outlined herein. Thirty-seven studies that evaluated the effective interventions were retained after the full-text screening and are narratively synthesised as follows.

3.5.2 Cognitive and behavioural therapies

Cognitive and behavioural therapies, which address cognitive and emotional aspects, are promising for treating gambling disorder. This section reviews interventions such as mindfulness-based approaches, CBT, motivational interviewing (MI), and counselling, focusing on their feasibility, acceptability and effectiveness, and highlighting key findings and future implications.

3.5.2.1 Feasibility and acceptability of cognitive and behavioural therapies

Van der Tempel et al. (2019) conducted a ten-week mindfulness-based intervention (MBI) for nine women with gambling disorder. Recruitment challenges reduced the sample size from the target of 28. The intervention achieved a 75% retention rate, indicating good acceptability. Participants valued the supportive group environment and meditative practices, suggesting improvements like introducing urge surfing later in sessions, due to its intensity, and providing audio recordings for home meditation guides. The study underscores MBI's potential benefits and recommends simplifying recruitment and pre-treatment procedures, to enhance engagement and reduce attrition.

3.5.2.2 Feasibility and engagement of cognitive and behavioural therapies

CBT

André et al. (2022) piloted a seven-week CBT-based programme for adolescents aged 12-17 with problem gambling. The study involved nine participants and showed strong feasibility, with no dropouts reported and high engagement. Satisfaction levels were high, demonstrating the intervention's acceptability. Key facilitators included the structured nature of CBT and its individualised approach.

Zhuang et al. (2018) evaluated an integrated cognitive behavioural intervention (CBI) for male problem gamblers in Hong Kong. The study, involving 84 participants, showed sustained effects, and significant improvements demonstrated feasibility and acceptability. The study highlights the importance of addressing cognitive dysfunctions and negative emotions to enhance treatment effectiveness.

Pasche et al. (2013) evaluated a CBT intervention that combined MI and imaginal exposure in South Africa, with 128 participants. Facilitated by the National Responsible Gambling Programme (NRGP), the intervention included six sessions and optional family involvement. There was a 32% dropout rate. This study suggests CBT's feasibility in low-resource settings and highlights the potential and challenges of implementing such programmes in diverse socio-economic contexts.

Wall et al. (2023) conducted a randomised pilot trial to evaluate a brief Internet-based CBT (ICBT) programme with therapist support for gambling problems, involving 43 participants. Recruitment averaged two participants per week, with a 47% attrition rate reported at six weeks. Engagement was high, with 86% of participants completing the online modules and a satisfaction rating of 7.5/10. Both groups reduced problem gambling, ranging from the beginning of the programme to the six-week follow-up, however, the high dropout rate suggested that a full-scale RCT would not be advisable. The study recommends incorporating motivational tools and frequent check-ups to improve retention in future studies.

Baño et al. (2021) evaluated a 16-week outpatient group CBT programme for 214 women with gambling disorder. The dropout rate was 42.1%, primarily within the first two months. Predictors of dropout included lower gambling disorder severity scores, higher distress, younger age, and fewer DSM-5 criteria.

Dunn et al. (2012) explored factors contributing to dropout in CBT for problem gambling through interviews with 25 participants. Early dropouts were linked to social gambling, non-compliance, and avoidance of personal issues. Facilitators included strong therapeutic alliances and social support. This study highlights the importance of tailored interventions and strong therapeutic relationships.

Jiménez-Murcia et al. (2015) evaluated a 16-week group CBT intervention for 440 participants, reporting a dropout rate of 44.5%. Predictors included younger age, lower education, and high self-transcendence traits. The study emphasises the role of demographic and personality factors in therapy engagement.

Pfund et al. (2018) examined dropout rates in gambling disorder interventions by tracking 334 clients at an outpatient practice using survival analysis. They found that 49% dropped out before achieving reliable change in psychological distress, as measured by the Beck Depression Inventory-II (BDI-II). The highest dropout rates occurred early: 15% after the assessment session, and 12% after the first treatment session. By session eight, 89% of those who would eventually drop out had done so. The study emphasised the importance of early treatment stages for retention and called for further research into factors influencing early dropout, to enhance treatment adherence and outcomes.

Ronzitti et al. (2017) explored predictors of treatment dropout by focusing on a sample of 846 treatment-seeking pathological gamblers at a specialist clinic. Using multinomial logistic regression, this observational study analysed the differences between treatment completers and dropouts, both before treatment and during treatment. The study primarily assessed engagement through dropout rates, with 44.8% not completing treatment, 27.4% dropping out before treatment, and 17.4% during treatment. Younger age and drug use predicted pre-treatment dropout, while smoking, a family history of gambling disorder, and lower Problem Gambling Severity Index (PGSI) scores predicted in-treatment dropout.

Motivational interviewing and Internet-based interventions

Brazeau et al. (2024) evaluated motivational interviewing (MI) in an Internet-based self-help intervention for 313 Canadian adults. Both groups showed equal improvements across all gambling outcomes and most secondary outcomes, except alcohol consumption. No significant differences in engagement metrics were found between MI and control groups, however, the number of completed modules was associated with a greater reduction in gambling behaviours between both groups. Many did not complete any modules, indicating the need for engaging programme designs.

Counselling interventions

Tse et al. (2013) investigated face-to-face versus telephone counselling for problem gambling. No significant differences in dropout rates or short-term outcomes were found. The high dropout rates in both groups highlight the need for retention strategies, suggesting that telephone counselling can be as effective as face-to-face counselling in the short term.

Cognitive therapy and exposure therapy

Smith et al. (2016) assessed cognitive therapy (CT) and exposure therapy (ET) for problem gambling. Although participants experienced a reduction in gambling behaviours from both therapies, higher dropout rates were seen in the ET group, due to difficulties with early-phase tasks and treatment goals. The study highlights the importance of aligning treatment strategies with participant preferences.

Smith et al. (2010) evaluated an exposure therapy intervention by the Statewide Gambling Therapy Service (SGTS) in South Australia. The dropout rate was 32%, with higher sensation-seeking traits and separated/divorced participants more likely to drop out. Significant improvements on all outcome measures, except alcohol, were recorded for participants who completed the treatment and for the treatment dropouts. The study suggests addressing specific traits, to improve retention.

3.5.3 Internet-based and technology-delivered interventions

Internet-based and technology-delivered interventions are increasingly important for treating gambling disorder, providing flexible and accessible options to patients. This section reviews studies on various interventions' feasibility, acceptability and effectiveness, including Internet-based treatment programmes, brief Internet interventions, smartphone-delivered ecological momentary interventions (EMIs), and general Internet-based interventions (IBIs).

3.5.3.1 Feasibility of Internet-based and technology-delivered interventions

Stenbro et al. (2023) evaluated SpilleFri, an Internet-based treatment for gambling disorder, through an uncontrolled pilot study with 24 patients. The ten-week programme included eight therapist-guided CBT modules. With a 29.2% dropout rate and 82.4% of completers providing full data, the study indicated feasibility. High acceptability was evident via a 74.6% satisfaction score on the credibility/expectancy questionnaire (CEQ). Benefits included flexible scheduling and reduced stigma, though issues with asynchronous communication and a lack of personalisation were noted. The study suggests SpilleFri as a feasible alternative to face-to-face treatment, although its uncontrolled design limits its robustness.

3.5.3.2 Feasibility and acceptability of Internet-based and technology-delivered interventions

Hawker et al. (2021) evaluated a five-week smartphone app-delivered ecological momentary intervention (EMI) with 36 participants. The trial showed high satisfaction (mean score = 8.86/12). Retention rates were 61% at post-intervention and 58% at follow-up. Facilitators included the intervention's helpfulness and accessibility, while barriers included technical issues and frequent ecological momentary assessment (EMA) notifications. The intervention reduced gambling severity, cravings, frequency and expenditure, suggesting its potential, despite engagement challenges.

3.5.3.3 Acceptability of Internet-based and technology-delivered interventions

Sanchez et al. (2019) examined the acceptability of IBIs through focus groups with clients (n=13) and clinicians (n=21). Key factors influencing acceptability included access, usability, technology quality, privacy, security, and professional guidance. Clinicians expressed concerns about clinical implementation and therapeutic relationships, while clients valued 24/7 availability and personalised support.

3.5.4 Pharmacological interventions

This section reviews feasibility, acceptability and engagement in pharmacological treatments, specifically focusing on intranasal naloxone and naltrexone, combined with brief motivational interventions, and involving findings from only two studies.

3.5.4.1 Feasibility and acceptability of pharmacological interventions

Castrén et al. (2019) assessed the feasibility and acceptability of intranasal naloxone for gambling disorder in an open-label study involving 20 participants. The study demonstrated a high completion rate of 90% and notable medication adherence. Participants reported high pre- and post-intervention acceptability, with a median score of 9.0. The low dropout rate (10%) and absence of serious adverse events confirmed the intervention's safety. Key facilitators included the non-invasive administration method and supportive phone consultations, while barriers were the small sample size and mild side effects.

3.5.4.2 Engagement in pharmacological interventions

Lahti et al. (2010) explored the combination of naltrexone pharmacotherapy with a motivational brief intervention in a study with 39 participants. Despite observing reductions in compulsive gambling and depressive symptoms, the study reported a high dropout rate of 51%. This significant attrition rate suggests a need for improved strategies to enhance participant retention in such interventions.

3.5.5 Group and support-based interventions

Group and support-based interventions are widely used in the treatment of gambling disorder, offering social support, shared experiences, and structured therapeutic approaches. This section reviews studies on the feasibility, acceptability and effectiveness of various group and support-based interventions, including metacognitive training (MCT), SBIRT interventions, emotion regulation strategies, and self-help groups.

3.5.5.1 Feasibility and acceptability of group and support-based interventions

Gehlenborg et al. (2021) evaluated the Gambling-MCT intervention in an uncontrolled pilot study with 25 participants. The intervention had a 72% completion rate, indicating feasibility. Participants reported high satisfaction, reflecting strong acceptance. Improvements in gambling symptoms and cognitive distortions were noted. Facilitators included the group format and standardised implementation, while barriers were recruitment difficulties and fluctuating motivation.

Heinlein et al. (2022) assessed a tailored SBIRT intervention for gambling within an HIV primary care clinic, involving 15 participants. The intervention was deemed feasible and acceptable, with clinicians finding it easy to administer and participants reporting it as acceptable. Notable reductions in gambling days and money spent were observed, particularly among those with severe gambling issues. The study suggested the need for a larger randomised controlled trial, to evaluate efficacy further.

Månsson et al. (2022) incorporated emotion regulation strategies into an eight-session weekly group treatment for gambling disorder, with 21 participants. The intervention led to a 47% decrease in Gambling Symptom Assessment Scale (G-SAS) scores and reduced GD symptoms. High satisfaction and acceptability were reported, with no adverse effects. Thematic analysis highlighted increased emotional awareness and management strategies among participants.

3.5.5.2 Acceptability of group and support-based interventions

Penfold and Ogden (2022) explored problem gamblers' experiences with Gamblers Anonymous (GA), CBT, and online/mobile resources through semi-structured interviews with ten participants. Thematic analysis revealed three main themes: degrees of investment, social comparison, and efficacy. GA was highly valued for its emotional and physical connection, investment, and non-judgmental peer support. In contrast, CBT and formal treatments were seen as less effective, due to a lack of personalisation and perceived judgment. Online interventions were considered less impactful still, lacking the physical interaction necessary to combat isolation.

Syvertsen et al. (2020) evaluated a theoretical self-help group for problem gambling in Norway, using semi-structured interviews with nine participants. Shared narratives and understanding, 'Keeping it relevant to problem gambling' and 'Changes over time'. For 'Keeping it relevant to problem gambling', two sub-themes

that expand upon the overarching theme was found: 'Complete sharing' and 'Finding solutions'. The three themes reflect how positive and negative experiences were organized around relational factors, concerns regarding meeting structure, and personal development, respectively. The study highlighted the importance of an accepting environment in self-help groups, to enhance engagement and support.

3.5.6 Personalised feedback interventions

Personalised feedback and motivational interventions have gained traction in the treatment of gambling disorder, due to their tailored approach and potential to enhance engagement and reduce gambling behaviours. This section reviews studies on the acceptability and engagement of these interventions, focusing on personalised feedback, outpatient treatment, and cognitive bias modification.

3.5.6.1 Acceptability of personalised feedback interventions

Cunningham et al. (2009) conducted a pilot study on a personalised feedback intervention for problem gamblers, involving 61 participants. The intervention provided summaries comparing individual gambling habits to those of the general population. At a three-month follow-up, participants who received personalised feedback showed reduced gambling expenditure. The feedback was highly rated for its usefulness, with 96% of participants recommending it to others. High engagement and practicality indicated strong acceptability, suggesting the need for a full-scale evaluation to confirm these promising findings.

3.5.7 Other interventions

3.5.7.1 Outpatient treatment

Grall-Bronnec et al. (2021) conducted a five-year longitudinal study on gambling disorder treatment, initially involving 628 participants. The study tracked engagement through dropout and relapse rates, with 310 participants continuing in the follow-up phase. Of the 87 participants followed annually, a 43.7% relapse rate was observed. Key predictors of relapse included the absence of a one-month abstinence period and low self-directedness.

3.5.7.2 Bias and regulation strategies in interventions

Snippe et al. (2023) conducted a pilot RCT on cognitive bias modification (CBM) for problem gamblers. The study faced a high attrition rate of 90.1%, with participants citing the time- consuming and repetitive nature of the training as significant barriers. Despite these challenges, the study suggests that incorporating relevant cues and motivational interviewing techniques could boost adherence and improve the intervention's effectiveness.

3.5.8 Summary of findings

The acceptability, feasibility and engagement of interventions for treating gambling disorder varied across all studies. Most studies reported engagement rates of 50% or higher for CBT, personalised feedback, and group or support-based interventions. Factors contributing to dropouts among patients included social gambling, non-compliance, demographic factors, and co-occurring substance abuse, with dropout rates tending to increase in the later stages of the intervention programmes.

Retention rates were high for Internet-based interventions, and, a greater number of patients completed treatment, indicating good feasibility and engagement. Where acceptability and satisfaction were measured, feedback was generally positive, with access, privacy, and personalised support identified as key factors influencing acceptability. Internet-based interventions received higher satisfaction rates overall.

No primary studies evaluated the acceptability, feasibility or engagement of oral pharmacological treatment alone. However, one systematic review reported in the umbrella review (Section 3.3) indicated significant dropout rates for those taking opiate antagonists (nalmefene and naltrexone), due to poor tolerability. One primary study found high acceptability with intranasal naltrexone, while another reported a 51% dropout rate for oral naltrexone and brief motivational interventions.

3.6 Facilitators and barriers to the delivery of gambling interventions

The effectiveness of gambling interventions is significantly influenced by various facilitators and barriers. Understanding these factors is crucial for developing strategies to improve treatment access, engagement and outcomes. This section reviews key studies on barriers to treatment for female problem gamblers, family involvement in treatment, screening for problem gambling in mental health services, gambling among older homeless adults, and the implementation of gambling prevention policies.

Kaufman et al. (2017) used semi-structured interviews with eight women receiving CBT through the NHS to identify barriers to treatment. External barriers included long waiting times, travel costs, and a lack of flexible options, such as childcare. Internal barriers were denial, fear of seeking help, stigma, and ambivalence towards quitting gambling. The study highlights the need for flexible and accessible treatment options to address these barriers effectively.

Kourgiantakis et al. (2017) studied 11 dyads (individuals with problem gambling and their family members) to identify facilitators and barriers to family involvement in treatment. Facilitators included effective communication, non-judgmental support, and improved coping strategies within the family. Barriers were family conflict, isolation, mental health issues, and substance use.

Rodda et al. (2018) conducted interviews with 30 clinicians and managers to identify barriers and facilitators to screening for problem gambling in mental health services. Barriers included competing priorities, a lack of routine screening protocols, inadequate screening tools, limited resources, patient reluctance to disclose gambling problems, and insufficient staff training. Facilitators included brief screening instruments, dedicated funding for workforce development, and increased awareness of gambling-related harms among healthcare providers. The study highlights the need for validated screening tools and targeted training programmes, to improve the detection and management of problem gambling in mental health settings.

Vandenberg et al. (2022) explored the relationship between gambling and homelessness among older adults in Victoria, Australia. Facilitators of gambling included mental and material well-being, social isolation, and the accessibility of gambling venues, like electronic gaming machines (EGMs). Barriers included the hidden nature of gambling problems within the homeless population and the low priority given to this issue by service providers. The study emphasises the need for improved housing security, regulatory controls on gambling venues, targeted interventions for this vulnerable group, and routine screening for gambling problems among older homeless adults.

Selin et al. (2019) examined the barriers and facilitators for implementing gambling prevention policies in Finland, through interviews with managers, specialists, and front-line workers. Barriers included insufficient funding, a lack of awareness about gambling issues, and structural challenges within organisations. Facilitators were the presence of existing networks, dedicated working groups focused on gambling prevention, and increased knowledge and awareness about gambling-related harms. The study concluded that understanding the broader implementation context, including these facilitators and barriers, is crucial for effectively deploying gambling prevention policies.

3.6.1 Summary of findings

Internal and external barriers and facilitators were identified in the evidence base, although the number of studies identified were limited. External barriers to treatment programmes for gambling disorder reported by patients included waiting times, travel costs, and a lack of childcare, while internal barriers consisted of denial, stigma, fear of seeking help, and family conflict.

Studies evaluating barriers and facilitators from managers', clinicians' and front-line workers' perspectives highlighted screening challenges, such as a lack of screening protocols and insufficient staff training. Other barriers included a lack of dedicated funding, a lack of awareness of gambling-related harms, and inadequate staff training.

3.7 Effective interventions for the treatment of gaming addiction: An umbrella review

3.7.1 Introduction

This section reviews international evidence on effective interventions for treating gaming addiction by synthesising the findings of published systematic reviews and meta-analyses. It highlights treatment strategies that address gaming addiction and considers their effectiveness in individuals with comorbid mental health conditions, other addictions, and marginalised groups.

3.7.2 Findings

During the full-text screening stage, 21 systematic reviews of interventions for gaming addiction were identified. Of these, nine met the inclusion criteria. A detailed list of excluded reviews, along with the justification for their exclusion, is provided in Appendix 3. The nine included reviews collectively evaluated 101 primary research studies on the effectiveness of interventions for treating gaming addiction. There was a significant overlap of primary research studies across the reviews, with 46 out of 101 studies being reported in at least two reviews (Appendix 4). Only one review (Zajac et al., 2017) was excluded, due to 100% overlap with Zajac et al., (2020).

3.7.3 Characteristics of included studies

The main characteristics of the included systematic reviews are presented in Table 5. In terms of design and due to the poor methodological quality of the primary research studies, five of the included reviews were restricted to providing a narrative synthesis (Chen et al., 2020; De Sá et al., 2023; King et al., 2017; Lampropoulou et al., 2022; Zajac et al., 2020), while four conducted a systematic review and meta-analysis (Danielsen et al., 2024; Kim et al., 2022; Stevens et al., 2018; Wang et al., 2023).

Five reviews examined the effectiveness of both psychological and pharmacological interventions, and combined psychological and pharmacological interventions (Danielsen et al., 2024; Kim et al., 2022; Lampropoulou et al., 2022; Wang et al., 2023; Zajac et al., 2020). Two investigated the effectiveness of psychological interventions only (Chen et al., 2020; Kim et al., 2022), and the remaining two reviews focused on the effectiveness of pharmacological interventions alone (De Sa et al., 2023) and the effectiveness of cognitive behavioural therapy (CBT) in the treatment of Internet gaming addiction (Stevens et al., 2018).

The primary studies within the individual systematic reviews differed significantly in their diagnostic methods, with each employing different criteria to screen for gaming disorder or Internet gaming disorder among participants. These differences resulted in varying definitions of gaming disorder or Internet gaming disorder. Additionally, there was variability in the types of psychotherapy interventions used, particularly CBT. Some studies primarily used mindfulness strategies, others used gaming-specific CBT or CBT focused on craving, while others applied standard CBT (either group or individual sessions). Due to these variations in definition, diagnosis, and the type of intervention strategies evaluated, we decided to synthesise the evidence on the effective interventions by intervention type (i.e. psychological +/- pharmacological, and other).

The publication dates for all nine included systematic reviews ranged from 2017 to 2024, with the highest number published in 2023 (n=3). The number of primary research studies included in each review varied from seven to 38. Eight systematic reviews included all age groups, while one focused exclusively on children and adolescents (Lampropoulou et al., 2022). Although all age groups were included in the reviews, the majority of primary research data relates to adolescents and young adults aged <18 years with gaming addiction.

Sources of funding were inconsistently reported across the nine included reviews. Seven reviews provided information on their funding sources, and only one reported the funding source(s) for the included primary studies, which affected their AMSTAR 2 rating of quality (reported as follows and explored in Section 5.4.1).

3.7.4 Psychotherapy interventions

Psychological interventions were the extensively studied and documented approaches for treating gaming addiction. Eight systematic reviews evaluated the effectiveness of psychological interventions for gaming addiction (Chen et al., 2020; Zajac et al., 2020; Danielsen et al., 2024; Kim et al., 2022; King et al., 2017; Lampropoulou et al., 2022; Stevens et al., 2018; Wang et al., 2023), with CBT being the most evaluated, either as a single intervention or in combination with other interventions. The common duration of CBT was reported to be six to eight sessions (King et al., 2017).

Overall, CBT demonstrated positive outcomes in treating gaming disorder and Internet gaming disorder, leading to significant reductions in symptoms, severity, and time spent gaming (Chen et al., 2020; Danielsen et al., 2024; Kim et al., 2022; King et al., 2017; Lampropoulou et al. 2022; Stevens et al., 2018; Wang et al., 2023; Zajac et al., 2020).

Danielsen et al. (2024) conducted a systematic review and meta-analysis consisting of 33 RCTs and five non-RCTs, finding an overall moderate to strong effect size (a standardised mean difference of 0.56) across various therapeutic treatments for gaming disorder symptoms. Among the interventions, psychotherapy showed the highest effect size (Hedge's g=0.68, [95% CI: 0.34 to 1.01], p<.001), while behavioural treatments also demonstrated significant medium effects (Hedge's g=0.55, [95% CI: 0.25 to 0.84], p <.001). The interventions

analysed included a combination of CBT and abstinence, CBT and acceptance, mindfulness, group CBT, and group counselling (Table 5). The quality of this review was rated high, indicating its reliability and rigour.

Stevens et al. (2018) evaluated the effectiveness of CBT and support these findings, highlighting that while CBT was highly effective in reducing Internet gaming disorder symptoms (Hedge's g=0.92; [95% CI: 0.50 to 1.34] p<0.001), it lacked sufficient power to confirm its impact on reducing time spent gaming. The effect size for individual CBT was medium and significant (Hedge's g= 0.59; [95% CI: 0.10 to 1.08], p<0.001), though high levels of heterogeneity were noted, indicating that individual CBT might be more effective than group CBT in reducing Internet gaming disorder symptoms (Stevens et al., 2018). The quality of this review was rated moderate. Similarly, Zajac et al. (2020) also reported positive outcomes for individual CBT, particularly when delivered online.

CBT, in combination with other psychological interventions, has also been found to have a positive effect on treating gaming addiction. Kim et al. (2022) conducted a pairwise and network meta-analysis including 17 psychological interventions, to assess their effectiveness in reducing excessive gaming (which the review authors do not consistently define, and it may relate to frequency, severity, etc., and so the findings are reported narratively). The results showed a large effect for all psychological interventions in reducing excessive gaming, when compared to inactive controls (Hedge's g=1.70, [95% CI 1.27 to 2.12]) and active controls (Hedge's g=0.88, [95% CI 0.21 to 1.56]). The CBT+mindfulness intervention showed positive weighted mean difference values, indicating greater effectiveness over all other interventions. The CBT+mindfulness intervention was more effective than the CBT+family or mindfulness interventions, but their differences were not significant (weighted mean differences=0.23-1.11, [95% CI: -1.39 to 2.68]). The top three ranked interventions (CBT+mindfulness, CBT+family, and mindfulness, in a row) were statistically significantly superior to CBT as a standalone treatment, as well as the rest of the treatments. The quality of this review was rated critically low.

Wang et al. (2023) also indicated a positive effect from combined therapies. This systematic review and meta-analysis evaluated the effectiveness of interventions across 43 primary studies. Of these, 22 were RCTs, eight non-RCTs, and 13 single-arm pre-post test designs. The results showed large to moderate effect sizes of combined therapies (Hedge's g=-2.11, [95% CI: -2.87 to -1.35], p<0.001), compared to pharmacotherapies (Hedge's g=-1.10, [95% CI: -1.31 to 0.89], p<0.05) or psychotherapies (Hedge's g=- 0.99, [95% CI: -1.22 to -0.76], p<0.001) in reducing Internet gaming disorder symptoms. These studies included a combination of CBT and abstinence, mindfulness, family therapy, and brief group education. The results highlighted that those combined therapies showed a larger effect size than pharmacotherapies, with effects maintained at follow-up in both psycho- and combined therapies. The quality of this review was rated low.

3.7.5 Pharmacological interventions

Five reviews including 12 primary research studies evaluated the effectiveness of pharmacological interventions in treating gaming disorder or Internet gaming disorder (De Sá et al., 2023; King et al., 2017; Lampropoulou et al., 2022; Wang et al., 2023; Zajac et al., 2020). The medication trials examined treatments using medications typically prescribed for depression (bupropion, escitalopram) or attention deficit hyperactivity disorder (ADHD) (methylphenidate or atomoxetine). Other studies reported using various selective serotonin reuptake inhibitors (SSRIs), such as fluoxetine, escitalopram and paroxetine (De Sá et al., 2023). The most common drug used to treat Internet gaming disorder was bupropion or bupropion sustained release (SR) (De Sá et al., 2023).

De Sá et al. (2023) undertook a systematic review including 12 trials to examine the effectiveness of pharmacological treatments in reducing symptoms of Internet gaming disorder. All studies included in the review were conducted in South Korea. A reduction in symptoms was observed from pre- to post-treatment across participants who received pharmacological treatment. Across all clinical trials, symptom (not always specified) reductions among participants who received pharmacological treatment ranged from

15.4% to 51.4%. When stratifying analyses by specific drug, atomoxetine promoted an 18.3% symptom reduction, bupropion promoted reductions ranging from 15.4% to 51.4%, SSRIs promoted reductions ranging from 17.6% to 24.0%, and methylphenidate promoted reductions ranging from 23.7% to 25.7% (ibid.). The quality of the review was rated low.

Zajac et al. (2020) undertook a systematic review including 22 trials and observed decreases in Internet gaming disorder symptoms in response to six- and 12-week courses of bupropion and an eight-week course of methylphenidate. Two studies presented head-to-head comparisons of two different drugs, one comparing a 12-week course of bupropion and escitalopram, and the other comparing 12-week courses of atomoxetine and methylphenidate. Although neither study had a placebo control group, both found decreases in symptoms, with no significant differences in efficacy between the drugs (ibid.). The quality of this review was rated critically low.

Similar findings were reported by King et al. (2017), who undertook an international systematic review and CONSORT evaluation, including 30 studies, to evaluate the effectiveness of interventions for treating Internet gaming disorder. Improvements in gaming behaviours were observed. The results highlight that CBT shows a positive effect in reducing symptoms of Internet gaming disorder. No meta-analysis was undertaken, and the quality of this review was rated low.

Wang et al. (2023) undertook a systematic review and meta-analysis. Four primary studies evaluated the effectiveness of combined pharmacological and psychological treatments, with durations ranging from eight to 12 weeks. Bupropion (versus other medications) (Hedge's g=-0.28, SE=0.14, p=0.06) was associated with a larger effect size. For psychotherapies, interventions with CBT only (versus other psychosocial approaches, or CBT plus other psychosocial approaches) were associated with a larger effect size (Hedge's g=-0.73, SE=0.23, p<0.05). The results highlighted that bupropion combined with CBT showed advantages over other treatments in symptom reduction. Combined therapies (Hedge's g=-2.11, [95% CI: -2.87 to -1.35], p<0.001) showed a larger effect size than pharmacotherapies (Hedge's g=-1.10, [95% CI -1.31 to -0.89], p<0.05) or psychotherapies (Hedge's g=-0.99, [95% CI: -1.22 to -0.76], p<0.001) in reducing Internet gaming disorder at post-intervention.

3.7.6 Other interventions

Other multiple interventions were reported in the included systematic reviews. These included virtual reality therapy (VRT), family-based therapy, self-discovery camps, educational programmes, and transcranial direct-current stimulation (tDCS) (Chen et al., 2023 Danielsen et al., 2024; King et al., 2017; Lampropoulou et al., 2022; Zajac et al., 2020). While some of these interventions show positive results in reducing symptoms, severity, and time spent gaming, the majority of these have not been evaluated by rigorously designed studies, but pilot studies suggest that additional study may be warranted (Zajac et al., 2020).

Table 5. Characteristics of included systematic reviews – Gaming Addiction Interventions

Author (year)	Date of search	Range (years) of incl. studies	Study design of incl. studies (n)	Population (n) and characteristics	Intervention(s) (n) vs comparison	Outcomes	Results	Meta-analysis (Y/N)	AMSTAR 2 Quality
Chen et al. (2023)	December 2021	2010 to 2021	*RCTs n=7	n=332 EG n=174 CG n=158 Age range: adolescents and adults	Psychological: -Group counselling (interactive group counselling) (3 weeks; 6 sessions) -Group counselling (interpersonal group counselling) (4 weeks; 8 sessions) -Group counselling (CBT) (9 weeks; 18 sessions) -CBI (k=1) (6 weeks; 6 sessions) Other: -tDCS (k=1) (5 days; 10 sessions) -ACRIP (k=1) (5 weeks;10 sessions) -Short-term CBT (k=1) (15 weeks; 15 sessions) **Comparator:** All 7 RCT control group = non-active. **Treatment duration:** The mean duration of the 7 interventions was 6.7 weeks; range: 3-15 weeks; 6-18 sessions.	**Primary** Severity of GD measured by diagnostic method of each study **Secondary** Depression, anxiety	Group counselling, CBI, ACRIP and short-term CBT interventions had a significant effect on decreasing the severity of GD. The tDCS intervention had no significant effect on behavioural and psychological indicators of GD	No	Critically low
Danielsen et al. (2024)	August 2022	2008 to 2022	RCTs n=33 nRCTs n=5	n=9524 EG n=5223 CG n=4301 Age range: 10 to 65 years	Psychological: -Group counselling (interactive group counselling) vs non-active controls (3 weeks; 6 sessions) -Group CBI vs WLC (6 weeks) -CBT vs supportive therapy (5 group + 8 individual) (15 weeks) -Interpersonal groups counselling vs no treatment	**Primary** Studies using a measure of GD or IGD **Secondary** None	Psychotherapy had the highest significant effect size (Hedge's g= 0.68, [95% CI: 0.34 - 1.01], p<.001). Behavioural (Hedge's g=0.55, [95% CI: 0.25 - 0.84], p<.001) Other (Hedge's g=0.63, [95% CI: 0.37 - 0.89], p<.001)	Yes	High

Author (year)	Date of search	Range (years) of incl. studies	Study design of incl. studies (n)	Population (n) and characteristics	Intervention(s) (n) vs comparison	Outcomes	Results	Meta-analysis (Y/N)	AMSTAR 2 Quality
					-CBT, group vs exercise group -PROTECT CBT vs no treatment controls (6 weeks; 6 sessions) -MORE vs SG <u>Behavioural:</u> -Abstinence vs NTC (14 days) (k=3) -CBI vs NTC (k=2) -CBI vs WLC -Abstinence/withdrawl vs no treatment -ARCIP vs no treatment -EABM vs placebo (6 days) -TPB vs NTC -Approach bias modification trainings, response inhibition training group vs RT+ApBM training. <u>Other:</u> -VR vs group CBT (4 weeks) -RC vs PM (8 sessions), RC + PM, psychoeducation (7 days) -CBT + PE vs CBT + counselling (14 weeks)		All were significantly different from null in the naive model.		
De Sá et al. (2023)	March 2022	2009 to 2018	n=12 RCTs n=4 Open-label trials n=8	n=724 Age range: all age groups 98% male	<u>Pharmacological:</u> -Bupropion vs healthy controls (12 weeks) -Bupropion vs placebo (8 weeks) -Bupropion SR vs healthy controls (6 weeks) -CBT + bupropion vs bupropion (8 weeks) -Bupropion SR vs	**Primary** Reductions in IGD symptoms, measured by various scales	All studies reported IGD symptom reductions (range: 15.4%-51.4%). ATM, 18.3%; bupropion, 15.4%-51.4%; SSRIs, 17.6%-24.0%; and MPH, 23.7%-25.7%.	No	Low

Author (year)	Date of search	Range (years) of incl. studies	Study design of incl. studies (n)	Population (n) and characteristics	Intervention(s) (n) vs comparison	Outcomes	Results	Meta-analysis (Y/N)	AMSTAR 2 Quality
					escitalopram (12 weeks) -Bupropion SR vs escitalopram (6 weeks) -SSRI escitalopram, fluoxetine or paroxetine vs control (6 months) (k=3) -SSRI (NR) vs controls (6 months) (k=2) -MPH (8 weeks) -MPH vs ATM (12 weeks)		Improvements in both MDD and ADHD IGD symptoms (n=3) reported.		
Kim et al. (2022)	October 2022	2002 to 2022	RCTs n=7 nRCTs n=10	n=745 Age range: 12 to 27 years Predominantly male – many studies reporting 100% male participation	<u>Psychological:</u> -VRT BT vs CBT group therapy (4 weeks) -Group CBI vs WLC (6 weeks) -Mindfulness therapy (8 weeks; 8 sessions) vs CBT (3 months) -CBT+family (24 weeks) vs CBT (3 months) -Group CBT v WLC (15weeks) -CBT + acceptance vs NTC (5 weeks) -CBT vs WLC (9 weeks) -CBT vs BT (2 months) -BT + mindfulness vs NTC (6 weeks) (k=4) -MI + BT vs NTC (4 weeks) -BT vs NTC (2 weeks) -BT vs WLC (1 month) - BT vs pseudo training (1 month) -BT vs NTC (2 weeks)	**Primary** Gaming, measured using GAS **Secondary** Depression, anxiety, impulsivity	A large overall effect was found for psychological interventions in reducing excessive gaming (SMD = 1.70 [95% CI: 1.27-2.12]), compared to inactive and active controls (Hedge's g=0.88 [95% CI: 0.21-1.56]). A combined treatment of CBT and mindfulness showed greater effectiveness over all other interventions. The top three ranked interventions (CBT + mindfulness, CBT + family, and mindfulness) were statistically significantly superior to CBT alone.	Yes Pairwise and network meta-analysis	Critically low

Author (year)	Date of search	Range (years) of incl. studies	Study design of incl. studies (n)	Population (n) and characteristics	Intervention(s) (n) vs comparison	Outcomes	Results	Meta-analysis (Y/N)	AMSTAR 2 Quality
King et al. (2017)	NR	2007 to 2017	n=30 RCTs n=11	n=1880 Pharmacological n=263 Psychotherapy n=1064 68% male and 32% female participants Eleven studies focused on adolescent participants only (n=11). Adult and adolescent participants (n=5)	Psychotherapy: -Group CBT (8 modules) v NTC (k=3) -CBT (12 sessions) (k =2) -Group CBT (12 modules) vs sport programme -Multimodal counselling (15-19 months) -CBT (8 sessions) vs NTC -Group CBT (3 months) vs control -Group counselling (6 sessions) vs NTC (k=2) -Psychotherapy (NR) -CBT (24 sessions) -MFGT vs WLC -MI group (6 sessions) vs WLC -CBT vs VRT vs NTC (4 weeks) -CBT + pharm (10 weeks) -CBT, counselling, programme (9 days) Pharmacological: -Escitalopram (10-20 mg) (10 weeks) vs placebo -Escitalopram (10-20 mg) (19 weeks) -MPH (8 weeks) -Bupropion (150-300 mg) (6 weeks) vs control -Bupropion (150-300 mg) + EDU (8 weeks) vs placebo + EDU -CBT (8 sessions) + bupropion (150-300 mg) vs bupropion (150-300 mg) Other: -Transcutaneous electrical nerve stimulation vs placebo -RT group vs NTC (5 weeks) -Electroacupuncture vs psychological intervention vs both	**Primary** Changes in gaming behaviours	Improvements in gaming behaviours were observed. The results highlight that CBT shows a positive effect in reducing symptoms of IGD, however, there are unresolved questions about the optimal length of treatment (e.g. number of sessions), short- and longer-term gains, i.e. durability of treatment response, and differences between individual versus group-based delivery.	No	Critically low

Author (year)	Date of search	Range (years) of incl. studies	Study design of incl. studies (n)	Population (n) and characteristics	Intervention(s) (n) vs comparison	Outcomes	Results	Meta-analysis (Y/N)	AMSTAR 2 Quality
Lampropoulou et al. (2022)	NR	2010 to 2020	n=16 RCTs n=9 nRCTs n=7	n=1116 Mainly children and adolescents with IGD	Pharmacological (k=3): -Bupropion + CBT vs bupropion only (8 weeks) -ATM vs MPH (12 weeks) -TAU for ADHD (4 weeks) Psychological (k=3): -Group CBT vs non-active controls (9 weeks) -CBT vs control (8 sessions) -Group CBT vs counselling (6 weeks) Other (k=10): -Family therapy -MMORPG speaking + writing course vs general EDU -HDJ-S (2 weeks) -Multifamily group therapy vs CG -Eclectic CBT vs family, MI (13 weeks) -RC, PM (8 sessions), RC + PM, basic psychoeducation, (9 days) -Group CBT PROTECT + programme (4 sessions) -PIPATIC program vs CBT (6 months) -CBT+/-psychoeducation group for parents -SDiC (CBT, counselling, programme) (9 days)	**Primary** Severity of IGD symptoms, time spent gaming **Secondary** ADHD, depression	CBT was the most effective and commonly reported IGD treatment, often paired with family therapy and medication, for better results. Alternative methods, such as camps and MI, were found to be beneficial also. In cases of comorbidity, such as depression or ADHD, the appropriate pharmaceutical intervention was also an effective option.	No	Critically low
Stevens et al. (2018)	NR	2007 to 2017	n=13 RCTs n=7 Post-test n=6	n=580 participants (individuals with IGD)	Psychological – CBT only: -Bupropion + CBT bupropion only (8 weeks) -Group CBT vs basic counselling (6 weeks) -Group VRT vs group CBT vs control (4 weeks) -Group CBT vs BT (12 weeks) -Group CBT vs NTC (k=4) -Individual CBT (k=4)	**Primary** IGD symptoms, time spent gaming **Secondary** Anxiety, depression	CBT showed high efficacy in reducing IGD symptoms (Hedge's g=0.92, [95% CI: 0.50-1.34], p<0.001) and depression (g=0.80) and a medium effect for anxiety (Hedge's g=0.55) at post-test, however, the effectiveness diminished significantly at follow-up, and there was insufficient evidence to determine its impact on reducing time spent gaming.	Yes	Moderate

Author (year)	Date of search	Range (years) of incl. studies	Study design of incl. studies (n)	Population (n) and characteristics	Intervention(s) (n) vs comparison	Outcomes	Results	Meta-analysis (Y/N)	AMSTAR 2 Quality
Wang et al. (2023)	August 2023	2010 to 2023	n=43 22 RCTs (n=22) 8 non-RCTs (n=8) Single-arm pre-post trials n=13	n=1738 Most studies recruited male participants. Age range: all age groups Mean age: 20 to 27.8	<u>Pharmacological:</u> -Bupropion (6 weeks) -MPH vs ATM (12 weeks) -Bupropion vs escitalopram vs NTC (6 weeks) -SSRIs (NR) (6 months) -Bupropion (12 weeks) -Bupropion + CBT vs bupropion only (8 weeks) -Bupropion + EDU vs placebo + EDU (8 weeks) -Bupropion + EDU vs escitalopram + EDU (12 weeks) -Med + CBT vs Med + SC (8 weeks) <u>Psychological:</u> -Group CBT vs counselling (6 weeks) -Eclectic psychotherapy (CBT, family, MI, solution focused) (13 weeks) -VRT vs group CBT vs control (4 weeks) -Group CBI vs WLC (6 weeks) -Mindfulness-oriented group vs SG (8 weeks) -SDiC (camp) abstinence CBT + medical lectures, 9 days (14 CBT + 3 medical lectures + 8 counselling) -Individual CBT vs individual CBT + parent psychoeducation (28 weeks) vs CBT -RC + PM vs basic psychoeducation (10 CBT + 4 media literacy courses + 2 workshops) (8 weeks) -Individual, specialised CBT (family) vs standard CBT (6 months) -CBT vs WLC (15 weeks) -CBT + PE vs CBT + counselling (8 CBT + 6 PA) (8 CBT + 6 SC) -CBT + acceptance (14 weeks) -Group BT vs CG (4 days) -CBT vs NTC -MDFT group vs FT group (6 months)	**Primary** Reduction in IGD symptom,gaming time, cravings related to IGD **Secondary** Depression, anxiety, ADHD, impulse control disorders	Pharmaco-, psycho- and combined therapies showed large to moderate effect sizes for IGD symptoms and comorbid mental disorders. Combined therapies (Hedge's g=-2.11, [95% CI: -2.87 to -1.35], p<0.001) showed larger effect sizes than pharmacotherapies (Hedge's g=-1.10, [95% CI: -1.31 to -0.89], p<0.05) or psychotherapies (Hedge's g=-0.99, [95% CI: -1.22 to -0.76], p<0.001) on IGD reduction at post-intervention. The effects of psycho- and combined therapies had been maintained at follow-up. Bupropion and CBT showed advantages over their counterparts.	Yes	Low

Author (year)	Date of search	Range (years) of incl. studies	Study design of incl. studies (n)	Population (n) and characteristics	Intervention(s) (n) vs comparison	Outcomes	Results	Meta-analysis (Y/N)	AMSTAR 2 Quality
					-MI + CBT + FT + RP (10 weeks) -BT vs NTC group (2 weeks) -Gaming abstinence vs NTC (7 days) -Parent group CBT + mindfulness + adolescents' routine treatment (8 weeks) -EABM vs Sham training (6 days) -CBT + strength-based motivational vs WLC (8 weeks) -CBT vs NTC (5 weeks) Other: -Active tDCS (4 weeks) -Active tDCS vs Sham tDCS (4 weeks) -Active tDCS vs Sham tDCS (1 week) -Active tDCS vs Sham tDCS (5 days) -Monitoring + visual feedback vs monitoring only vs NTC (28 days) -Brief group educational intervention (3 months) -VRT (2 sessions) -Family therapy (3 weeks)				
Zajac et al. (2020)	August 2019	2009 to 2018	n=22 RCTs n=7 nRCTs n=6 Pre-post test design n=9	All studies focused on adolescents or young adults, with the exception of one medication trial that recruited children with a mean age of 9.3 years.	<u>Pharmacological (k=7):</u> -Bupropion (6 weeks) -Bupropion vs escitalopram vs NTC (6 weeks) -Bupropion vs escitalopram (15 weeks) -ATM vs MPH (12 weeks) Bupropion + CBT vs bupropion only (8 weeks) -Bupropion + EDU vs placebo + EDU (8 weeks) <u>CBT-based psychotherapy (k=8):</u> -Group reality & mindfulness therapy (6 weeks) -Individual CBT vs individual CBT +parent psychoeducation (15 weeks) -Specialised CBT vs standard CBT (6 months)	**Primary** Severity of IGD symptoms, time spent gaming	Narrative results only, under heading 'expert opinion,' reporting that none of the treatment approaches reviewed have been studied with enough rigour to establish efficacy. The review authors report the effectiveness of CBT and pharmacological interventions in decreasing IGD symptoms. Additionally, bupropion was reported in this review to be superior to the	No	Critically low

Author (year)	Date of search	Range (years) of incl. studies	Study design of incl. studies (n)	Population (n) and characteristics	Intervention(s) (n) vs comparison	Outcomes	Results	Meta-analysis (Y/N)	AMSTAR 2 Quality
					-Craving behavioural intervention vs no intervention control (6 weeks) -CBT group therapy vs basic counselling (6 weeks) -Mindfulness-orientated group therapy vs support group (8 weeks) -CBT + Bupropion vs Bupropion (8weeks) -CBT group vs VRT group (8 weeks) *Other treatment interventions (k=7)* - tDCS (4 wks;12 sessions) -Family therapy (3weeks) - Brief voluntary abstinence (84hours) -Eclectic psychotherapy (CBT, family, MI, solution-focused) (13 sessions) -Self-discovery camp (9 days) -Residential camp (RC) vs parent management (PM) vs RC+PM (8 weeks) -MMORPG speaking and writing course vs general EDU (8weeks)		placebo, in terms of reducing gaming time and IGD symptoms.		

ACRIP, Acceptance and Cognitive Restructuring Intervention Program; ATM, atomoxetine; BT, behavioural therapy; CBI, craving behavioural intervention; CG, control group; EABM, emotional association bias modification; EG, experimental group; GAS, game addiction scale; GD, gaming disorder; IGD, Internet gaming disorder; MDD, major depressive disorder; MFGT, multi-family group therapy; MI, motivational interviewing; MORE, Mindfulness-Oriented Recovery Enhancement; MPH, methylphenidate; NTC, non-treatment control; NR, not reported; PA, parent advice; PE, physical exercise; PM, parent management; *RCT, randomised control trial; RP, relapse prevention; RT, reality therapy; SC, supportive counselling; SDiC, self-discovery camp; SG, support group; SMD, standardised mean difference; SSRI, selective serotonin reuptake inhibitor; TAU, treatment-as-usual; tDCS, transcranial direct-current stimulation; TPB, theory of planned behaviour; VRT, virtual reality therapy; WLC, wait list control.

3.7.7 Methodological quality of included reviews

The methodological quality of included reviews was assessed using the AMSTAR 2 tool (Shea et al., 2017). As highlighted in Section 2.6.2, we identified eight critical domains that undermine the overall confidence in the evidence reported in the review. The methodological quality of the included systematic reviews varied. One review was graded as having a high methodological quality, one rated as having a moderate methodological quality, two rated as having a low methodological quality, and five rated as having a critically low methodological quality. A full description of the AMSTAR 2 16-item assessment for each systematic review is provided in Appendix 5.

3.7.8 Summary of findings

This summary examines the findings reported from nine systematic reviews. CBT was the most widely studied psychological intervention for treating gaming addiction, showing positive results in reducing symptom severity and gaming time, with individual CBT often more effective than group sessions. Combined therapies, such as CBT with mindfulness or family interventions, were also particularly effective. Pharmacological treatments for gaming, particularly for patients with comorbid conditions such as ADHD and depression, also proved beneficial, with medications such as bupropion, methylphenidate (MPH) and atomoxetine (ATM) significantly improving Internet gaming disorder symptoms.

Combined psychological and pharmacological treatments demonstrated the highest efficacy, with large to moderate effect sizes sustained at follow-up. Reviews indicated variability in diagnostic methods and intervention strategies, but psychotherapy, especially CBT, had the highest significant effect size. Other interventions, such as virtual reality therapy (VRT) and transcranial direct-current stimulation (tDCS), showed some positive results, but further studies are required.

The evidence from the primary studies included in each of the 9 systematic reviews remains weak. The heterogeneity of the included studies – in relation to study designs, intervention characteristics, and screening and diagnostic tools – was evident, and this limits the ability to draw definite conclusions. These variations may have contributed to the differences in the magnitude of the summary effect observed across the reviews. The weak methodological quality of the included systematic reviews also limits the overall confidence in the findings. Therefore, the results should be interpreted with caution, due to the methodological weaknesses.

3.8Treatment of gaming disorder for individuals with comorbid mental health conditions, other addictions, and marginalised groups

3.8.1 Introduction

The intersection of gaming and comorbidities has garnered significant attention in recent years, particularly as online gaming becomes increasingly prevalent across various age groups. This section explores the complex relationship between excessive gaming and various psychological disorders, such as major depressive disorder (MDD), attention deficit hyperactivity disorder (ADHD), and emotional dysregulation. Studies have highlighted the potential for pharmacological and therapeutic interventions to mitigate the impacts of problematic gaming behaviours and associated comorbidities, offering critical insights into integrated treatment approaches.

This section reviews the findings from three systematic reviews and five additional primary research studies examining the efficacy of different treatments – including bupropion, CBT, and other medications – in addressing the dual challenges of gaming addiction and comorbid mental health conditions. These investigations show the potential for comprehensive and continuous treatment strategies to enhance patient outcomes and sustain mental health improvements.

3.8.2 Treating gaming disorder and comorbid mental health conditions

Three reviews reported on the effectiveness of interventions for people with comorbid mental health conditions associated with Internet gaming disorder (De Sá et al., 2023; Lampropoulou et al., 2022; Wang et al., 2023). Each of these reviews provides insights into how various treatments impact both gaming addiction and mental health comorbidities for participants.

Wang et al. (2023) conducted a systematic review and meta-analysis on the effectiveness of various therapies for Internet gaming disorder among patients with comorbid mental conditions (e.g. depression, anxiety, ADHD, impulse control disorders). For pharmacotherapies, interventions using bupropion (versus other medications) (Hedge's g=-0.28, SE=0.14, p=0.06) were associated with a larger effect size. For psychotherapies, interventions with CBT only (versus other psychosocial approaches, or CBT plus other psychosocial approaches) were associated with a larger effect size (Hedge's g=-0.73, SE=0.23, p=0.002). The results of this review demonstrated the short-term effects of pharmaco-, psycho- or combined therapies for treating Internet gaming disorder and improving comorbid mental conditions. According to the review authors, one plausible reason is that these treatments are adapted from well-established therapies for treating mental health disorders (not specified, but they may imply CBT) and improve Internet gaming disorder symptoms by mitigating these comorbid mental health conditions. This suggests that the treatments may be transdiagnostic and cost-effective by addressing more than one condition simultaneously.

3.8.3 Treating gaming addiction and attention deficit hyperactivity disorder

According to the systematic review by Lampropoulou et al. (2022) (Table 5), pharmacological treatments, particularly methylphenidate (MPH) and atomoxetine (ATM), are effective in managing both ADHD symptoms and Internet gaming disorder while reducing impulsivity and time spent online. These findings are based on

three primary studies included in this review. The PIPATIC programme (integrating CBT with family therapy) demonstrates substantial benefits in reducing the symptoms of Internet gaming disorder and improving comorbid conditions, highlighting the value of holistic, family-inclusive treatment approaches.

The review by De Sá et al. (2023) highlights the high prevalence of comorbid psychiatric conditions among individuals with Internet gaming disorder. According to the authors, these comorbidities complicate assessing pharmacological treatments, as improvements in Internet gaming disorder symptoms might result from reduced symptoms of conditions such as ADHD, depression and anxiety. For instance, when Internet gaming disorder co-occurred with ADHD, psychostimulant use obscured whether the symptom reduction was due to direct effects on Internet gaming disorder or improvements in ADHD. Bupropion was the most frequently used drug for Internet gaming disorder, noted for its broad efficacy across conditions.

In addition to the aforementioned systematic reviews, Lee et al. (2021) conducted a longitudinal study on the impact of ADHD comorbidity on the course of Internet gaming disorder over three years. The sample included 255 participants aged 11 to 42 years, comprising 128 individuals diagnosed with Internet gaming disorder and 127 participants with comorbid ADHD. Participants underwent an eight-week treatment programme involving CBT and medications (medications for symptoms of depressive mood, poor attention, and impulse and behavioral control), with additional care as needed and annual follow-ups. The study found that the ADHD-Internet gaming disorder group had a lower recovery rate (60%), compared to the Internet gaming disorder group (93%) by Year 3 and exhibited higher recurrence rates and severity of Internet gaming disorder symptoms. Changes in ADHD symptoms were significantly associated with changes in Internet gaming disorder symptoms.

Chang et al. (2020) conducted a study to understand the treatment efficacy on Internet gaming disorder in youths with ADHD and emotional dysregulation. The sample included 101 ADHD-affected youths, aged seven to 18 years, recruited from outpatient units in Taipei, Taiwan. The intervention involved pharmacotherapy, with methylphenidate, atomoxetine and Abilify, along with CBT and family therapy. The results indicated that the treatment efficacy for Internet gaming disorder was good when ADHD symptoms were controlled, with significant reductions in disruptive mood dysregulation disorder (DMDD) symptoms, by 71.9%, 74.8% and 84.4% at Weeks 2, 3 and 4, respectively. The study highlighted that emotional dysregulation, specifically DMDD, was frequently noticed in severely gaming-addicted ADHD-affected youths.

3.8.4 Treating gaming and major depressive disorder

Nam et al. (2017) conducted a study to compare the effects of bupropion and escitalopram on excessive Internet gameplay in patients with major depressive disorder (MDD) and Internet gaming disorder. The sample included 30 patients who completed a 12-week double-blind trial, with participants randomised to either a bupropion or escitalopram group. Both medications were effective in reducing depressive symptoms and the severity of Internet gaming disorder, using Young's Internet Addiction Scale (YIAS). Problematic Internet gameplay was defined as excessive Internet gameplay of more than four hours per day or 30 hours per week. Bupropion demonstrated greater efficacy in reducing impulsivity and attentional symptoms, compared to escitalopram. The study found that bupropion decreased functional connectivity (FC) within the salience network, and between the salience network and the default mode network (DMN), while escitalopram decreased FC only within the DMN. The findings suggest that bupropion may be particularly beneficial for patients with comorbid impulsivity and attention deficits. The study provides valuable insights into the differential impacts of these medications on brain connectivity and symptomatology in patients with MDD and Internet gaming disorder.

Han and Renshaw (2012) conducted a study to evaluate the efficacy of bupropion in treating excessive Internet gaming and comorbid depression. Initially, 57 male patients were included, but the final analysis focused on 50 participants, aged 13 to 45 years, who had both MDD and problematic Internet gaming behaviours. The intervention consisted of bupropion treatment combined with education on Internet use. The findings demonstrated that bupropion significantly reduced the severity of both Internet addiction – using Young's Internet Addiction Scale (YIAS) – and depressive symptoms, compared to a placebo, during the active treatment phase. Notably, while the reduction in Internet gameplay persisted during the post-treatment follow-up, depressive symptoms recurred, highlighting the need for the ongoing management of depression.

Kim et al. (2012) investigated the efficacy of combined CBT and bupropion in treating problematic Internet gameplay in adolescents with MDD. The study included 72 male adolescents, aged 13 to 18, diagnosed with MDD and excessive Internet gaming disorder, using Young's Internet Addiction Scale (YIAS), with data from 65 participants analysed after some discontinued, due to side effects. Participants were randomly assigned to a CBT-Med group (n=32), receiving CBT and bupropion, or a Med group (n=33), receiving only bupropion. The intervention involved eight weekly CBT sessions aimed at correcting distorted cognitions, improving communication, and enhancing family cohesion, alongside bupropion medication. The CBT-Med group showed significant reductions in Internet gameplay severity and anxiety, and improved life satisfaction and school adaptation, compared to the Med group. Depression scores did not differ significantly between the groups. The study included an eight-week treatment period and a four-week follow-up period. The findings suggest that combined CBT and bupropion effectively reduce problematic gaming and anxiety while enhancing life satisfaction and school adaptation in adolescents with comorbid depression and gaming addiction, highlighting the potential for integrated treatment approaches in clinical practice.

The studies reviewed highlight the complex relationship between excessive Internet gaming and psychological comorbidities, such as MDD and ADHD. Treatments such as bupropion and CBT have proven to be effective in reducing gaming addiction and its associated symptoms, with combined approaches showing the most promise. Managing ADHD symptoms is particularly important in improving outcomes for Internet gaming disorder. Overall, integrated and ongoing treatment strategies are essential for effectively addressing the dual challenges of gaming addiction and mental health disorders, offering a pathway to sustained mental health improvements.

3.8.5 Summary of findings

The findings demonstrate the positive effects of pharmacological, psychological or combined therapies for treating Internet gaming disorder, particularly in individuals with co-occurring mental health conditions. CBT showed the largest effect sizes among psychological interventions for treating Internet gaming disorder in this population. The pharmacological interventions evaluated included bupropion, methylphenidate (MPH) and atomoxetine (ATM). Bupropion was the most-used drug for Internet gaming disorder co-occurring with ADHD, noted for its broad efficacy. MPH and ATM were also reported to be effective in managing ADHD symptoms, Internet gaming disorder, impulsivity, and reducing time spent online. Although these findings are based on the results of limited primary studies, it is clear from the evidence that combined therapies demonstrated significant benefits, effectively addressing both Internet gaming disorder and related mental health conditions. These interventions may be transdiagnostic, resulting in the interventions not only being clinically effective, but also cost-effective, by targeting multiple conditions simultaneously. This supports an integrated treatment approach for individuals with gaming addiction and comorbid mental health disorders.

3.9 Evaluation of effective interventions for treating gaming addiction

3.9.1 Introduction

Eleven studies that evaluated the effective interventions identified in the umbrella review were retained after full-text screening and are narratively synthesised as follows.

Recent studies have evaluated aspects of the implementation of various therapeutic approaches for treating Internet gaming disorder. The identified studies evaluated various interventions – including CBT, relapse prevention models, parent-centred interventions, mindfulness-based programmes, and holistic multi-component therapies – as interventions demonstrating varying effectiveness and highlighting the importance of personalised and adaptable treatments. No studies were identified that evaluated the acceptability or feasibility of implementing pharmacological interventions for gaming disorder.

André et al. (2022) and Gurdal et al. (2023) focused on CBT and relapse prevention (RP) models. The former conducted a pilot study to evaluate the acceptability and feasibility of a seven-week CBT-based RP intervention for adolescents diagnosed with problem gaming, delivered in routine psychiatric care in southern Sweden. The sample size included nine adolescents, aged 12 to 17 years, and five consented to repeated assessments. The uptake rate was 100% (all nine invited adolescents agreed to participate). All participants completed the treatment and assessments, indicating acceptability for the population. Follow-up details included pre-treatment, post-treatment, and six-month follow-up assessments, with standardised interviews and self-report measures. The participants who responded to the evaluation (n=5) reported that the treatment helped them regulate their RP.

Gurdal et al. (2023) conducted a qualitative study to evaluate adolescents' perceptions of RP treatment for problem gaming, focusing on gaming behaviours and parent-child relationships. The study consisted of adolescents aged 13 to 18 years. A total of 12 participants were selected for interviews, with only nine participating. Follow-up interviews at six months' post-treatment examined experiences, gaming behaviour changes, and parent-child dynamics. Despite the small sample (n=9), RP treatment helped these adolescents to gain better control over gaming, improve their mindsets, and engage more in schoolwork and hobbies. In addition, the adolescents found RP effective in controlling their gaming habits and improving their relationships with their parents. The treatment aided in regaining control over gaming behaviours, suggesting that balanced gaming is a more realistic goal than complete cessation. Family involvement and supportive clinicians were crucial, though structured home assignments were less engaging for some participants.

Hülquist et al. (2022 undertook a pilot study that evaluated the effectiveness of Res@t-P, an eight-week parent-centred intervention for adolescents with problem gaming, focusing on parental and family improvements and psychological stress reduction. The sample size included 43 parents of adolescents. The dropout rate was 18.6%, with eight parents not completing the programme. Parents in Res@t-P reported feeling relieved and supported by the exchange of experiences, worries and needs associated with their children's problem gaming with other parents. Despite these findings, eight parents did not finish the programme and were assessed only at the beginning of the training. Their reasons were related to jobs (three parents), stress (two parents) and Covid-19 (two parents), or included a lack of coherence (one parent). Thus, the dropout rate was 18.6%.

Kochuchakkalackal et al. (2023) undertook an RCT to examine the Acceptance and Cognitive Restructuring Intervention Program (ACRIP) for Internet gaming disorder across various Asian cultures. ACRIP was developed using a mixed-method approach to address Internet gaming disorder among adolescents. The programme covers aspects of the cognitive behavioural model, which links Internet gaming disorder to dysfunctional self-perceptions, and mindfulness theory, which promotes mindful thinking and behaviours. The results found significant improvements in Internet gaming disorder symptoms and psychological well-being, demonstrating the programme's adaptability and effectiveness in diverse cultural contexts. The sample size included 30 adolescents (15 in the experimental group, and 15 in the control group). No participants were reported to have dropped out of the intervention programme. ACRIP significantly reduced Internet gaming disorder symptoms and improved psychological well-being, demonstrating cultural adaptability.

Li et al. (2018) undertook a Stage 1 RCT to evaluate Mindfulness-Oriented Recovery Enhancement (MORE) as a treatment for Internet gaming disorder. Mindfulness interventions effectively treat substance use and gambling disorders (e.g. Li et al., 2017; Toneatto et al., 2014). However, mindfulness interventions have not been evaluated regarding their efficacy in treating Internet gaming disorder. As such, the authors adapted MORE, an evidence-based manualised treatment for addiction and co-occurring distress (Garland, 2013), and pilot-tested the adapted MORE treatment protocol for Internet gaming disorder with US adults. MORE integrates training in mindfulness, cognitive reappraisal skills, and savouring natural rewards into a therapeutic approach designed to modify automatic behavioural habits and the hedonic dysregulation associated with addictive behaviours (Garland, 2016). This study evaluated the effects of MORE, compared to a support group (SG), and found significant reductions in Internet gaming disorder symptoms, gaming cravings, and maladaptive cognitions, with benefits maintained at a three-month follow-up. The sample size included 30 adults (15 in MORE, 15 in the SG). The uptake rate was 12.1% (30 out of 248 eligible individuals). The dropout rates were 3.3% at post-treatment and 20% at the three-month follow-up. Follow-up details included pre- and post-treatment and three-month follow-up assessments, including online surveys. Despite the positive results observed in this study and the fact that most participants completed assessments at post-treatment and the three-month follow-up, a substantial proportion did not attend any treatment sessions. The time demands required for study participation, time conflicts between study participation and work/school events, and comparatively low incentives for study participation might have precluded high treatment engagement and completion rates, according to the authors.

Szász-Janocha et al. (2020) assessed the effectiveness of an early intervention programme (PROTECT+) for adolescents with Internet gaming disorder in Germany, involving 54 patients, aged nine to 19 years (M=13.48, SD=1.72). The PROTECT+ programme, a cognitive-behavioural group therapy, demonstrated a significant reduction in Internet gaming disorder symptoms at the four-month follow-up, with a small effect size in self-reported symptom severity reduction (d=0.35). The study found high satisfaction regarding the treatment programme at the one- and four-month follow-ups.

Pallesen et al. (2015) explored an eclectic therapy, combining CBT, family therapy, solution-focused therapy, and motivational interviewing. A total of 22 males were recruited for this programme. Despite moderate effect sizes, the improvement reported by the patients failed to reach statistical significance. Seven participants withdrew before treatment initiation, and three dropped out. Thus, a total of 12 participants only completed this treatment.

Torres-Rodríguez et al. (2018) analysed the PIPATIC programme, which incorporated psychoeducation, individual and family counselling, and coping strategies, showing reduced Internet gaming disorder symptoms and improved overall well-being. The sample size included 17 participants who completed the treatment. Follow-up details included comparative data at the pre-treatment, mid-treatment, post-treatment, and three-

month follow-up sessions. PIPATIC demonstrated reduced gaming time, Internet gaming disorder symptoms, and comorbid conditions, improving interpersonal, family, and educational/occupational functioning.

Wendt et al. (2021) and Sim et al. (2021) also highlighted the importance of structured yet flexible programmes addressing emotional management, social skills, and family involvement. Wendt et al. (2021) conducted a qualitative interview study in a German clinic with nine participants (seven Internet gaming disorder patients, aged 12 to 18 years, and two psychotherapists) to evaluate group therapy requirements. The study participants highlighted the importance of group cohesion and competent leadership. A 41.7% dropout rate was noted due to symptom denial, insufficient motivation, or severe comorbid symptoms.

Sim et al. (2021) reported benefits from the multifaceted Cyber Wellness Enrichment Programme (CWEP), which includes individual and family counselling, group mentoring, and alternative activities. The sample size included ten male adolescents and 11 parents who completed the three-month programme. Follow-up included interviews conducted in person and over the phone, lasting approximately 60 minutes each. The programme – integrating individual, family and group interventions with counsellor involvement – effectively managed gaming disorder.

Park et al. (2020) evaluated a brief Internet-delivered intervention to reduce gaming-related harms in New Zealand. The pre-post study involved 50 adults seeking to reduce their gaming time. Based on self-determination theory, the intervention included goal-setting, action-planning, and relapse prevention. Feasibility was confirmed with rapid recruitment and 86% engagement. The programme effectively reduced gaming time and intensity while improving well-being, although time management and social pressure were significant barriers. The intervention demonstrated feasibility and potential effectiveness in addressing gaming-related harms.

3.9.2 Summary of findings

This summary reviews studies assessing or evaluating the implementation of various therapeutic approaches for treating gaming disorder. The interventions examined include CBT, relapse prevention models, parent-centred interventions, mindfulness-based programmes, and holistic, multi-component therapies. The findings from these studies highlight the need for personalised and adaptable treatment approaches, to manage gaming disorder effectively. No studies were found that evaluated the acceptability of pharmacological interventions for treating gaming disorder, leaving a gap in this area of research.

Engagement levels varied across interventions, with most studies reporting engagement rates of 50% or higher. Factors such as time demands and constraints were identified as significant barriers to sustained participation in the intervention programmes.

Several studies emphasised the importance of family- and adolescent-focused interventions, particularly for reducing gaming symptoms. Support networks, including other parents, were also noted as beneficial for parental engagement and treatment success.

Across the studies, sample sizes were generally small, indicating the need for more extensive research, to better understand the efficacy and feasibility of these interventions.

Section 4: Cost-effectiveness of successful interventions

Although cost-effectiveness data was relatively scarce, two studies were identified that evaluated cost-effective interventions for treating gambling addiction. No cost-effective studies were found evaluating cost-effective interventions for treating gaming addiction. Hedman et al. (2012) undertook a systematic review to evaluate the efficacy and cost-effectiveness of Internet-based CBT (ICBT) in treating a range of psychiatric disorders, including gambling addiction. The results suggest that ICBT has more than a 50% probability of being cost-effective, compared to no treatment or to conventional CBT.

An economic analysis was undertaken to support the development of the UK draft guideline (Table 3) to assess the cost-effectiveness of a range of psychological and psychosocial treatments for adults experiencing problem gambling. Group CBT was identified as the most cost-effective treatment, with motivational interviewing identified as the second. Individual behavioural therapy and counselling are also likely to be cost-effective, compared to no treatment, from a public-sector perspective, especially considering that the public-sector cost estimates utilised in the model are likely to be an underestimate of the true costs associated with gambling-related harms (NICE evidence review underpinning recommendation, 1.5.12, 2023).

Section 5: Discussion

5.1 Summary of findings: interventions, approaches and guidelines for the treatment and management of gambling addiction

5.1.1 Guidelines for the treatment and management of gambling addiction

Two international guidelines – one from Australia (2011), and a more recent **draft** guideline from the UK (2024) – on the treatment and management of gambling addiction were included in this review. Despite the older Australian guideline, both align with current best practices in guideline development.

The UK draft guideline emphasises the importance of using current, up-to-date validated screening tools, such as the South Oaks Gambling Screen (SOGS) or the Problem Gambling Severity Index (PGSI). The Australian guideline suggests using various screening tools, based on expert consensus.

Both guidelines recommend screening for gambling disorder in individuals with high-risk mental health conditions (such as those undergoing mental health assessments or treatments), reinforcing the growing recognition of the link between gambling addiction and co-occurring mental health issues.

Both guidelines support the use of psychological interventions, particularly CBT or MI, as first-line treatments. A pharmacological intervention, particularly naltrexone, is also recommended if psychological interventions fail to achieve the desired outcome, or in cases of repeated relapse with psychological interventions alone. These psychological and pharmacological recommendations are evidence based, reflecting a holistic approach to treating and managing gambling addiction. The quality of both these guidelines was rated high, using the AGREE II tool.

5.1.2 Effective interventions for treating gambling addiction

The umbrella review (Section 3.3) narratively synthesised findings from 18 systematic reviews and meta-analyses on effective interventions for treating gambling addiction. A substantial number of reviews on therapeutic interventions have been conducted in recent years, providing evidence of positive short-term outcomes. However, there is limited evidence supporting the long-term effectiveness of these interventions, and it remains unclear as to whether any one mode of delivery is superior to another. This suggests a need for further research to determine the most effective treatment approaches over time, and to identify the best delivery method for managing gambling disorder.

Thirteen systematic reviews focused on psychological treatments for gambling addiction. While a range of psychological interventions were assessed, CBT – either alone or combined with MI – consistently emerged as the most effective intervention in reducing gambling severity and symptoms. Other approaches, such as brief interventions and personal feedback, were also evaluated, but CBT remained the most promising intervention in treating gambling addiction.

Five systematic reviews evaluated the effectiveness of pharmacological interventions, including antidepressants, opioid antagonists, mood stabilisers, anticonvulsants (topiramates), and atypical antipsychotics. While opioid antagonists (such as naltrexone) showed preliminary support, the overall conclusions on pharmacological interventions were mixed across the included reviews.

In summary, psychological treatments, particularly CBT and MI, appear to be the most effective in treating and managing gambling addiction. Given the uncertainty surrounding the effectiveness of pharmacological interventions, further research with larger and more rigorous studies is necessary to confirm the findings and better understand the role of medications in treating gambling addiction. However, the studies were small, and the review method was not robust.

5.1.3 Effective interventions for treating gambling addiction and comorbid mental health conditions, other addictions, and marginalised groups

Research has highlighted an association between problem gambling and a range of comorbid disorders, including mental health conditions such as anxiety and mood disorders, substance use, and personality disorders, in addition to psychotic spectrum disorders (Disley et al., 2011; Rogers et al., 2019).

From synthesising the evidence, CBT emerged as the most widely studied and effective intervention for treating patients with gambling disorder, especially when combined with comorbid mental health conditions such as anxiety, depression, schizophrenia, PTSD and suicidal ideation. Additionally, the intervention Seeking Safety was found to be effective, particularly for patients with PTSD.

Although results from a meta-analysis on pharmacological interventions (Dowling et al., 2022) revealed mixed results on the reduction of depressive and anxiety symptoms, these findings relating to antidepressants versus placebos should be interpreted cautiously, given other important features and limitations of the evidence. The individual trials were small and supported only a modest pooled sample of participants. As such, this comparison may have lacked the power to detect modest effects of the pharmacological intervention(s). There was significant heterogeneity of the included studies in relation to study designs, intervention characteristics, and screening and diagnostic tools, and this limits the ability to draw definite conclusions.

Among the nine primary studies evaluating treatments for gambling disorder in patients with other addictions, various interventions specifically targeting both gambling and alcohol addiction were synthesised. These studies also exhibited differences in study design and outcome measures, with small sample sizes. The interventions evaluated included congruence couple therapy (CCT), brief personalised feedback, CBT, naltrexone combined with CBT, and motivational interviewing (MI).

CCT was the only intervention reported to be effective in reducing both gambling and alcohol use. While CBT was effective in reducing gambling behaviours, it did not lead to reductions in alcohol consumption and was associated with poorer outcomes, including higher dropout rates and lower compliance overall. MI was found

to be effective in one study, but the small sample size limits its generalisability, and no significant differences were observed in group therapy. One study evaluating the combination of naltrexone and CBT showed significant short-term improvements, though these benefits were not sustained at the one-year follow-up.

Additionally, two qualitative studies explored the impact of self-management strategies on treating gambling disorder among individuals experiencing homelessness and poverty. These studies emphasised that gambling and homelessness are interconnected, with gambling frequently serving as a coping mechanism for the mental health challenges caused by homelessness.

5.1.4 Evaluations of effective interventions for gambling addiction

5.1.4.1Acceptability, feasibility and engagement

The acceptability, feasibility and engagement of interventions for treating gambling disorder varied across all studies. Most studies reported engagement rates of 50% or higher for CBT, personalised feedback, and group or support-based interventions. Factors contributing to dropouts among patients included social gambling, non-compliance, demographic factors, and co-occurring substance abuse, with higher dropout rates observed in the later stages of the intervention programmes. Supporting our findings, Merkouris et al. (2016) undertook a systematic review on predictors of treatment outcomes, reporting findings from 33 studies on all psychological treatments for adults seeking treatment for gambling disorder. They reported that higher numbers of treatment sessions attended were associated with better gambling behaviour outcomes, and a range of socio-economic factors also predicted treatment outcomes.

For Internet-based interventions, retention rates were high, and a greater number of patients completed treatment, indicating good feasibility and engagement. Where acceptability and satisfaction were measured, feedback was generally positive, with access, privacy, and personalised support identified as key factors influencing acceptability. Internet-based interventions received higher satisfaction rates overall.

No primary studies evaluated the acceptability, feasibility or engagement of oral pharmacological treatment alone. However, one systematic review reported in the umbrella review (Section 3.3) indicated significant dropout rates for those taking opiate antagonists (nalmefene and naltrexone), due to poor tolerability.

Outcome and relapse rates were influenced by several factors, including patients' personal experiences, the presence of other mental health conditions, and patient demographic variables. Many studies of patients with gambling disorder have explored factors associated with treatment dropout and relapse, and provide an understanding about precipitating factors. For example, factors that can increase the odds of a gambling relapse include a lifelong history of a mood disorder, an alcohol abuse diagnosis, and when support ended during treatment follow-up (Hodgins and El-Guebaly, 2010). This highlights the importance of personalised treatment plans that consider individual patient characteristics and comorbidities, to optimise treatment effectiveness and reduce the risk of relapse.

5.2 Summary of findings: interventions, approaches and guidelines for the treatment and management of gaming addiction

5.2.1 Guidelines for the treatment and management of gaming addiction

No guidelines were identified for the treatment and management of gaming addiction. One editorial summary was published on a guideline for the management of gaming addiction, however, we were unable to source the full guideline, and it was published in Chinese.

5.2.2 Effective interventions for treating gaming addiction with comorbid mental health conditions, other addictions, and marginalised groups

The umbrella review (Section 3.7) synthesised the evidence from nine systematic reviews. CBT was the most widely studied psychological intervention for treating gaming addiction, showing positive results in reducing symptom severity and gaming time, with individual CBT often more effective than group sessions. Combined therapies, such as CBT with mindfulness or family interventions, were also particularly effective.

Pharmacological treatments have shown potential benefits for managing Internet gaming disorder, particularly when comorbid conditions such as ADHD and depression are present. Medications such as bupropion, methylphenidate (MPH) and atomoxetine (ATM) significantly improve symptoms, according to findings from the evidence provided. The current evidence highlights that, after treatment with MPH, ADHD symptoms had improved significantly. The effectiveness of MPH against problematic Internet gaming in adolescents with ADHD was compared to ATM. Both MPH and ATM reduced the severity of Internet gaming disorder symptoms, and this reduction was correlated with impulsivity reduction, which also resulted from both ADHD medications (Park et al., 2020). Although these findings were based on 12 primary studies, the results related to bupropion stemmed from six primary studies (n=195 participants), while the findings on MPH were derived from two articles (n=106 participants), and those on ATM were based on a single article (n=40 participants). This limited number of studies suggests that while the initial results are promising, further research with larger sample sizes and more robust designs is needed to confirm the effectiveness of these pharmacological treatments for Internet gaming disorder and related comorbid conditions, like ADHD and depression.

Notably, the application of both pharmacological and psychological interventions may be transdiagnostic. This makes these interventions not only clinically effective, but also cost-effective, as they address more than one condition simultaneously. This supports an integrated treatment approach for individuals with gaming addiction and comorbid mental health disorders. However, according to Łukawski et al. (2019), it remains unclear whether these medications treat the underlying psychiatric disorder or the gaming addiction itself.

5.2.3 Evaluations of effective interventions for treating gaming addiction

Only a minority of studies were identified that evaluated the effectiveness of gaming interventions. The interventions examined include CBT, relapse prevention models, parent-centred interventions, mindfulness-based programmes, and holistic, multi-component therapies. The findings from these studies highlight the need for personalised and adaptable treatment approaches, to manage gaming disorder effectively. No

studies were found that evaluated the acceptability of pharmacological interventions for treating gaming disorder, leaving a gap in this area of research.

Engagement levels varied across psychological interventions, however, most studies reported engagement rates of 50% or higher. Factors such as time demands and constraints were identified as significant barriers to sustained participation in the psychological intervention programmes for treating gaming addiction.

Several studies emphasised the importance of family- and adolescent-focused interventions, particularly for reducing gaming symptoms. Support networks, including other parents, were also noted as beneficial for parental engagement and treatment success.

Across the studies, sample sizes were generally small, indicating the need for more extensive research, to better understand the efficacy and feasibility of these interventions.

5.2.4 Cost-effectiveness of successful interventions

Only two studies relating to the cost-effectiveness of psychological interventions were identified. One study specifically assessed the cost-effectiveness of Internet CBT, reporting a 50% probability of being cost-effective, when compared to either no treatment or to conventional CBT.

An economic analysis was undertaken to support the development of the UK draft guideline (Table 3) to assess the cost-effectiveness of a range of psychological and psychosocial treatments for adults experiencing problem gambling. Group CBT was identified as the most cost-effective treatment, with motivational interviewing identified as the second. Individual behavioural therapy and counselling are also likely to be cost-effective, compared to no treatment, from a public-sector perspective, especially considering that the public-sector cost estimates utilised in the model are likely to be an underestimate of the true costs associated with gambling-related harms.

These findings suggest that ICBT, group CBT, and motivational interviewing may offer potential cost savings, but more research is needed to strengthen the evidence base and confirm their cost-effectiveness, relative to other therapy methods.

5.3 Strengths and limitations

One of the main strengths of this review is in the robust and comprehensive search that was employed. This approach was chosen with the aim of capturing as much relevant evidence, due to the scope of the review questions. The search strategy was piloted and refined by the research team, with consultation from content experts and a health sciences subject librarian and information specialist at DCU. Three members of the review team independently screened the titles and abstracts of over 9,000 records and full-text articles that met the inclusion criteria. The large body of evidence on this topic is growing and evident by the number of already published systematic reviews and the years of publication. More than 50% of the gambling systematic reviews and meta-analyses and over 65% of the gaming systematic reviews and meta-analyses have been published since 2019 and 2020, respectively.

The methodological approach employed is also a strength of this evidence review. Umbrella reviews are a relatively new approach to synthesising research evidence. According to Aromataris et al. (2014), if there are

systematic reviews already published over the previous five to ten years, these will most likely capture primary research studies published in the previous 30 years. In addition, conducting an umbrella review provides the ability to address a broad scope of issues related to a topic of interest, and it is ideal for presenting a wide picture of the evidence related to a particular question (ibid.).

Despite this, umbrella reviews also present unique methodological challenges and limitations (Pollock et al., 2023). Some of the challenges encountered in this review included an overlap of primary studies across the included reviews, the quality of reporting within reviews, and synthesising heterogeneous findings (Pollock et al., 2023). Many of the empirical studies reviewed rely heavily on retrospective self-report measures and cross-sectional designs, and this may result in a socially desirable response bias.

5.3.1 Quality of the evidence

Two high-quality guidelines for the treatment and management of gambling addiction were included in this review and assessed using the AGREE II tool. Both these guidelines were independently assessed by two members of the review team and deemed to be high quality.

While a strength of the umbrella review methodology is the ability to efficiently synthesise the highest levels of evidence across a breadth of literature, the review output is invariably limited by the content of the included reviews and a lack of precision, due to the level of synthesis produced. The methodological quality of the included systematic reviews reported in Section 3.3.6 and Section 3.7.7 was rated lower than anticipated. The quality of these systematic reviews was assessed independently by two members of the review team, using the AMSTAR 2 tool. The evidence from the primary studies included in each of the reviews also appeared to be weak. Only one systematic review and meta-analysis on interventions for gambling addiction was graded as having a high methodological quality, six rated as having a low methodological quality, and 11 rated as having a critically low methodological quality.

In terms of the included systematic reviews on interventions for treating gaming addiction, only one systematic review was graded as having a high methodological quality, one rated as having a moderate methodological quality, two rated as having a low methodological quality, and five rated as having a critically low methodological quality.

The systematic reviews' low methodological quality was clearly exacerbated by low-quality existing research that makes up the body of evidence on interventions for treating gambling and gaming addictions. The reviews included in the synthesis were broad assessments of the available evidence, encompassing a heterogeneous range of intervention types and study designs. As a result, the AMSTAR 2 tool, which is used to assess the quality of systematic reviews, may provide an overly stringent evaluation of the evidence base in this area. The heterogeneity of the primary research may contribute to a lower quality rating under AMSTAR 2, even though the systematic reviews are reflective of the current state of research.

The variations observed in the outcomes measured across the included systematic reviews are of concern. The primary studies within the individual systematic reviews differed significantly in their study designs, intervention types, outcome measures and diagnostic criteria, for both gambling and gaming disorders. There was considerable variability in the types of psychological interventions used across the studies, particularly for CBT. The duration and length of sessions also varied, making it unclear which specific elements of CBT were most effective. This inconsistency highlights the need for further research, to identify the key components of CBT that contribute to its effectiveness in managing both gambling and gaming addiction among population

groups. Standardising treatment protocols could enhance the comparability of studies and improve our understanding of the most beneficial aspects of CBT.

Sources of funding were inconsistently reported across the systematic reviews. Although there are seven critical domains, according to the AMSTAR 2 tool, the authors acknowledge that this is advisory, and that appraisers should decide which items are most important for the review under consideration. As a result of this and following discussions with all members of the evidence review team and content experts, we identified an additional item (Item 10) – 'Did the review authors report on the sources of funding for the studies included in the review?' – as a critical domain. Of the 18 systematic reviews and meta-analyses included for gambling addiction, 14 provided information on their own funding sources for the review, with only five (27.7%) reporting the funding sources for the included primary studies. This is particularly concerning, and it is possible that some of the primary studies included in these reviews were directly, or indirectly, supported by industry funding. There is a risk of bias if gambling research is funded through industry funding. Babor and Miller (2014) noted that much of the research produced by the National Center for Responsible Gambling – now the International Center for Responsible Gaming – in the US failed to disclose its funding. Sources of funding were also inconsistently reported across the nine included reviews that evaluated effective interventions for treating gaming addiction. Seven reviews provided information on their funding sources, and only one reported the funding source(s) for the included primary studies.

5.4 Comparisons to other overviews of reviews

Pfund et al. (2023) evaluated the methodological rigour of existing meta-analyses of CBT for gambling harms. The results of this umbrella review indicate that CBT significantly reduces gambling disorder severity (Hedge's g=-0.91) and gambling frequency (Hedge's g=-0.52), relative to minimal and no treatment control at post-treatment, suggesting that 65% to 82% of participants receiving CBT show greater reductions in these outcomes.

Blank et al. (2021) undertook a mapping review to identify review-level evidence for interventions to prevent gambling-related harms and to explore policy implications. Thirty primary studies were included in this mapping review. The findings identified the importance of whole-population prevention interventions, such as demand reduction (n=3) and targeted treatment interventions for individuals addicted to gambling. According to the findings, and in addition to individual-level interventions, a public health approach suggests that there are opportunities to reduce gambling-related harms by intervening across the whole gambling pathway, from regulation of access to gambling to screening for individuals at risk and services for individuals with an identified gambling problem.

McMahon et al. (2019) undertook an umbrella review on prevention and harm reduction interventions on gambling behaviours. Similar to that of Blank et al. (2021), much of the review's evidence base relates to pre-commitment and limit-setting self-exclusion. The quality of the included reviews and primary studies was reported to be generally poor, with a paucity of research on supply reduction interventions noted. Interestingly, McMahon et al. (2019) also found that just over half of the reviews reported their funding sources, and none of the reviews systematically assessed the funding sources of their primary studies. Hence, an important consideration for future empirical research and evidence syntheses is the adequate reporting of all funding sources and potential conflicts of interest. This would allow for greater transparency in this field of research.

Section 6: Conclusion

This review synthesises the evidence from two international guidelines on the treatment and management of gambling addiction. Eighteen systematic reviews and meta-analyses of the effectiveness of pharmacological and psychological interventions in treating gambling addiction were also narratively synthesised, as were nine reviews on interventions for treating gaming addiction. Twenty-five primary studies on effective interventions for treating gambling addiction in patients with comorbid mental health conditions, other addictions, and marginalised backgrounds were identified and synthesised, and also included were five primary studies evaluating effective interventions for treating gaming addiction in patients with comorbid mental health conditions, other addictions, and marginalised backgrounds. This breakdown indicates a greater research focus and available evidence on gambling addiction interventions, compared to gaming, both in synthesis and evaluation. The results revealed a variety of psychological and pharmacological interventions for treating gambling or gaming addiction among various populations. In general, CBT has a larger evidence base than pharmacotherapy for treating gambling and gaming addictions. However, the evidence supporting the use of pharmacological interventions varied across different population groups. An opioid antagonist (naltrexone) was identified for use in patients who had multiple relapses from psychological interventions for treating gambling addiction, with medications such as bupropion, methylphenidate (MPH) and atomoxetine (ATM) significantly improving the symptoms of gaming addiction, especially in patients who had co-occurring ADHD.

Despite these positive findings, the results of this review should be interpreted cautiously, given other important features and limitations of the evidence, especially with respect to the particular types of intervention in the specific patient groups. The individual trials were small and supported only a modest pooled sample of participants. As such, this comparison may have lacked the power to detect modest effects of the intervention(s). There was significant heterogeneity of the included studies in relation to study designs, intervention characteristics, and screening and diagnostic tools, and this limits the ability to draw definite conclusions.

Although the overall quality of the included systematic reviews was generally low, the findings aligned with the recommendations from the two high-quality international guidelines included herein. In addition, the findings in this review also aligned with the findings from other umbrella reviews. Although the studies included in this review of interventions addressed problem gambling or targeted problem gamblers, it is important to acknowledge the limitations of these terms in addressing gambling-related harms at a societal or population level. The findings reported in this evidence review provide individuals, clinicians and policymakers with empirical evidence that psychological interventions produce clinically meaningful reductions in both gambling and gaming disorders' severity and symptoms.

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Appendices

Appendix 1. Search strategy

Summary of electronic database searches by output

Electronic databases	Search date	Results
Ovid MEDLINE	1 March 2024	3,736
Ovid EMBASE	1 March 2024	4,150
Ovid PsycINFO	1 March 2024	3,604
EBSCO CINAHL Complete	1 March 2024	3,478
Scopus	2 March 2024	550
Other resources searched		
Cochrane Database of Systematic Reviews	2 March 2024	174
Database of Abstracts of Reviews of Effects (DARE)	2 March 2024	0

Search strategies for individual databases
Ovid MEDLINE

Search date: 1 March 2024

Search #	Search terms	Output
1	exp Gambling/ OR Gambl*.mp.	10,945
2	Game*.mp. OR exp Video Games/	67,684
3	gaming.mp.	4,251
4	"Internet gaming disorder".mp. OR exp Internet Addiction Disorder/	1,517
5	"Internet gambling disorder".mp.	2
6	"gaming disorder".mp. OR exp Internet Addiction Disorder/	1,702
7	"gambling disorder".mp.	945
8	1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7	78,982
9	exp Behavior, Addictive/ OR addicti*.mp.	65,661
10	exp Compulsive Behavior/ OR compulsive.mp.	41,915
11	dependence.mp.	203,279
12	problematic.mp.	48,431
13	excessive.mp.	145,935
14	pathological.mp.	359,635
15	disorder.mp.	741,635
16	9 OR 10 OR 11 OR 12 OR 13 OR 14 OR 15	1,486,691
17	intervention.mp. OR exp Early Intervention, Educational/ OR exp Internet-Based Intervention/ OR exp Psychosocial Intervention/	727,424
18	Person-Centered Psychotherapy/ OR exp Psychotherapy, Group/ OR exp Psychotherapy, Brief/ OR psychotherapy.mp. OR exp Psychotherapy/	230,394
19	17 OR 18	913,406
20	8 AND 16 AND 19	3,736

Ovid EMBASE

Search date: 1 March 2024

Search #	Search terms	Output
1	'pathological gambling'/exp OR 'pathological gambling' OR 'game addiction':ab,ti	8,351
2	intervention OR therapy OR psychotherapy OR treatment	15,153,711
3	Internet AND gaming AND addiction	2,464
4	'Internet gaming addiction'	99
5	'gaming disorder'	2,099
6	'pathological gambling'	7,940
7	'gambling disorder'	1,633
8	'gambling addiction'	374
9	'gaming addiction'	385
10	gaming	8,181
11	3 OR 4 OR 5 OR 6 OR 7 OR 8 OR 9 OR 10	15,823
12	2 AND 11	6,869
13	'game addiction'/exp OR 'game addiction' OR 'pathological gambling'/exp OR 'pathological gambling'	10,405
14	1 AND 12 AND 13	4,150

Ovid PsycINFO

Search date: 1 March 2024

Search #	Search terms	Output
1	TI gambl* OR AB gambl* OR MA gambl* OR TI game* OR AB game* OR MA game* OR TI "gambling disorder" OR AB "gambling disorder" OR MA "gambling disorder" OR TI "gaming disorder" OR AB " gaming disorder" OR MA "gaming disorder"	67,547
2	TI addicti* OR AB addicti* OR MA addicti* OR TI compul* OR AB compul* OR MA compul* OR TI pathological OR AB pathological OR MA pathological OR TI dependen* OR AB dependen* OR MA dependen*	359,592
3	TI intervention OR AB intervention OR MA intervention OR TI treatment OR AB treatment OR MA treatment OR TI therapy OR AB therapy OR MA therapy OR TI psychotherapy OR AB psychotherapy OR MA psychotherapy	1,258,867
4	1 AND 2 AND 3	3,604

EBSCO CINAHL Complete

Search date: 1 March 2024

Search #	Search terms	Option(s)	Output
S1	TI Gambl* OR AB Gambl* OR MW Gambl* OR TI game* OR AB game* OR MW game* OR TI gaming OR AB gaming OR MW gaming OR TI (gaming disorder or Internet gaming disorder or gaming addiction) OR AB (gaming disorder or Internet gaming disorder or gaming addiction) OR MW (gaming disorder or Internet gaming disorder or gaming addiction)	**Expanders** - Apply equivalent subjects, **Search modes** - Boolean/Phrase	34,450
S2	TI gambling disorder OR AB gambling disorder OR MW gambling disorder	**Expanders** - Apply equivalent subjects, **Search modes** - Boolean/Phrase	743
S3	S1 OR S2	**Expanders** - Apply equivalent subjects, **Search modes** - Boolean/Phrase	34,450

Search #	Search terms	Option(s)	Output
S4	TI addicti* OR AB addicti* OR MW addicti* OR TI compul* OR AB compul* OR MW compul* OR TI dependen* OR AB dependen* OR MW dependen* OR TI problem* OR AB problem* OR MW problem*	**Expanders** - Apply equivalent subjects, **Search modes** - Boolean/Phrase	524,514
S5	TI excessive* OR AB excessive* OR MW excessive* OR TI pathological OR AB pathological OR MW pathological OR TI disorder OR AB disorder OR MW disorder OR TI overuse OR AB overuse OR MW overuse	**Expanders** - Apply equivalent subjects, **Search modes** - Boolean/Phrase	449,282
S6	S4 OR S5	**Expanders** - Apply equivalent subjects, **Search modes** - Boolean/Phrase	900,754
S7	TI (treatment or intervention or therapy) OR AB (treatment or intervention or therapy) OR MW (treatment or intervention or therapy) OR TI training OR AB training OR MW training OR TI workshop OR AB workshop OR MW workshop OR TI psychotherapy OR AB psychotherapy OR MW psychotherapy	**Expanders** - Apply equivalent subjects, **Search modes** - Boolean/Phrase	2,844,978
S8	S3 AND S6 AND S7	**Expanders** - Apply equivalent subjects, **Search modes** - Boolean/Phrase	3,478

Scopus

Search date: 2 March 2024

Search #	Search terms	Output
1	(TITLE-ABS-KEY (gambl*) OR TITLE-ABS-KEY (game*) OR TITLE-ABS-KEY (“gambling disorder”) OR TITLE-ABS-KEY (“gaming disorder”))	491,799
2	(TITLE-ABS-KEY (addicti*) OR TITLE-ABS-KEY (compul*) OR TITLE-ABS-KEY (pathological) OR TITLE-ABS-KEY (dependen*))	5,771,927
3	(TITLE-ABS-KEY (intervention) OR TITLE-ABS-KEY (treatment) OR TITLE-ABS-KEY (pathological) OR TITLE-ABS-KEY (therapy) AND TITLE-ABS-KEY (psychotherapy))	127,324
4	1 AND 2 AND 3	550

Appendix 2. Table of excluded guidelines

Table of excluded guidelines (gambling) (n=5)

Publisher/organisation	Country	Year	Guideline title	Reason(s) for exclusion
Office of Problem Gambling Services, Dept of Public Health	USA (Massachusetts)	2018	*Practice Guidelines for Treating Gambling-Related Problems*	No information on population group
Lingford-Hughes et al.	UK	2012	*BAP updated guidelines: evidence-based guidelines for the pharmacological management of substance abuse, harmful use, addiction and comorbidity: recommendations from BAP*	Recommendations not focused on gambling or gaming addiction. The focus of this paper is on other addictions, e.g. alcohol, nicotine.
Casu et al.	Italy	2023	*Rolling the Dice: A Comprehensive Review of the New Forms of Gambling and Psychological Clinical Recommendations*	These recommendations are based on limited evidence (n=2 studies) and one meta-analysis, which are included in the umbrella review.
Gainsbury et al.	Australia	2014	*Recommendations for International Gambling Harm-Minimisation Guidelines: Comparison with Effective Public Health Policy*	Only one small piece on brief interventions – mostly policy
Ministry of Health Singapore	Singapore	2011	*Management of Gambling Disorders*	Exclude on quality of guideline, using AGREE II

Table of excluded guidelines (gaming) (n=1)

Author/organisation	Country	Year	Guideline title	Reason(s) for exclusion
Xiang et al.	China	2020	*An Overview of the Expert Consensus on the Prevention and Treatment of Gaming Disorder in China (2019 Edition)*	Only an overview – no recommendations provided

Appendix 3. List of excluded systematic reviews (gambling, gaming, and other addictive disorders)

Table of excluded gambling reviews (Stage One of full-text screening) (n=25)

Author	Year	Title	Reason(s) for exclusion
Achab et al.	2011	*Psychopharmacological treatment in pathological gambling: a critical review*	Exclude on study design
Akcayir et al.	2023	*Emerging Gambling Problems and Suggested Interventions: A Systematic Review of Empirical Research*	Exclude on outcome
Blank et al.	2021	*Interventions to reduce the public health burden of gambling-related harms: a mapping review*	Exclude on study design
Buth et al.	2012	*Effects of interventions in the field of universal and selective problem gambling prevention: An international literature review*	Exclude on language
Cowlishaw et al.	2014	*Pathological and problem gambling in substance use treatment: A systematic review and meta-analysis*	Exclude on outcome
de Lisle et al.	2011	*Mindfulness and Problem Gambling: A Review of the Literature*	Exclude on study design
Di Nicola et al.	2020	*Pharmacological and Psychosocial Treatment of Adults With Gambling Disorder: A Meta-Review*	Exclude on study design
Forsström et al.	2020	*A systematic review of educational programs and consumer protection measures for gambling: an extension of previous reviews*	Exclude on outcome
Grande-Gosende et al.	2020	*Systematic Review of Preventive Programs for Reducing Problem Gambling Behaviors Among Young Adults*	Exclude on outcome
Keen et al.	2017	*Systematic Review of Empirically Evaluated School-Based Gambling Education Programs*	Exclude on outcome
Kotter et al.	2019	*A Systematic Review of Land-Based Self-Exclusion Programs: Demographics, Gambling Behavior, Gambling Problems, Mental Symptoms, and Mental Health*	Exclude on intervention
Kourgiantakis et al.	2013	*Problem Gambling and Families: A Systematic Review*	Exclude on population
Kraus et al.	2020	*Current pharmacotherapy for gambling disorder: a systematic review*	Exclude on design – expert opinion

Author	Year	Title	Reason(s) for exclusion
Leibetseder et al.	2011	*Efficacy and effectiveness of psychological and psycho-pharmacological treatments in pathological gambling - A meta-analysis*	Exclude on language
Lozano et al.	2022	*Systematic Review: Preventive Intervention to Curb the Youth Online Gambling Problem*	Exclude on intervention
McMahon et al.	2018	*Effects of prevention and harm reduction interventions on gambling behaviours and gambling related harm: An umbrella review*	Exclude on outcome
Marchica et al.	2019	*The Role of Emotion Regulation in Video Gaming and Gambling Disorder: A Systematic Review*	Exclude on intervention
Merkouris et al.	2016	*Predictors of outcomes of psychological treatments for disordered gambling: A systematic review*	Exclude on outcome
Meyer et al.	2018	*The impact of supply reduction on the prevalence of gambling participation and disordered gambling behavior: A systematic review*	Exclude on outcome
Pfund et al.	2023	*Cognitive-behavioral treatment for gambling harm: Umbrella review and meta-analysis*	Exclude on study design
Pfund et al.	2021	*Dropout from face-to-face, multi-session psychological treatments for problem and disordered gambling: A systematic review and meta-analysis*	Exclude on outcome
Škařupová et al.	2020	*Early intervention and identification of gambling disorder: a systematic literature review of strategies implemented by gambling operators*	Exclude on study design
Vassallo et al.	2023	*The Efficacy of Psychosocial Interventions in Minimising the Harm Caused to Affected Others of Problem Gambling: A Systematic Review and Meta-Analysis*	Exclude on population
Velasco et al.	2021	*Prevention and Harm Reduction Interventions for Adult Gambling at the Local Level: An Umbrella Review of Empirical Evidence*	Exclude on intervention
Whitty et al.	2021	*Health Promotion Strategies to Address Gambling-Related Harm in Indigenous Communities: A Review of Reviews*	Exclude on study design

Table of excluded gambling reviews (Stage Two of full-text screening) (n=17)

Author	Year	Title	Reason(s) for exclusion
Carrascosa-Arteaga et al.	2023	*Effectiveness of Physiotherapy in Managing Symptomatology in Gambling Disorder Patients: A Systematic Review*	Did not perform meta-analysis
Challet-Bouju et al.	2017	*Cognitive remediation interventions for gambling disorder: A systematic review*	Did not perform meta-analysis
Concerto et al.	2023	*Transcranial Magnetic Stimulation for the Treatment of Gambling Disorder: A Systematic Review*	Did not perform meta-analysis
Fiskaali et al.	2023	*Preventive Interventions and Harm Reduction in Online and Electronic Gambling: A Systematic Review*	Did not perform meta-analysis
Hayer et al.	2022	*Effects of consumer protection measures in online gambling: A systematic review*	Did not perform meta-analysis
Higueruela-Ahijado et al.	2023	*Efficacy of cognitive-behavioral therapy in improving the quality of life of people with compulsive gambling, a systematic review*	Did not perform meta-analysis
Marchica et al.	2016	*Examining personalized feedback interventions for gambling disorders: A systematic review*	Did not perform meta-analysis
Moreira et al.	2024	*A Systematic Review on Intervention Treatment in Pathological Gambling*	Did not perform meta-analysis
Petry et al.	2017	*A systematic review of treatments for problem gambling*	Did not perform meta-analysis
Pettorruso et al.	2021	*Non-invasive brain stimulation targets and approaches to modulate gambling-related decisions: A systematic review*	Did not perform meta-analysis
Pickering et al.	2018	*Measuring treatment outcomes in gambling disorders: a systematic review*	Did not perform meta-analysis
Ribeiro et al.	2021	*Non-pharmacological treatment of gambling disorder: a systematic review of randomized controlled trials*	Did not perform meta-analysis

Author	Year	Title	Reason(s) for exclusion
Rodda et al.	2022	*A Systematic Review of Internet Delivered Interventions for Gambling: Prevention, Harm Reduction and Early Intervention*	Did not perform meta-analysis
Sagoe et al.	2021	*Internet-based treatment of gambling problems: A systematic review and meta-analysis of randomized controlled trials*	Did not perform meta-analysis
Smith et al.	2013	*Assessing Randomised Clinical Trials of Cognitive and Exposure Therapies for Gambling Disorders: A Systematic Review*	Did not perform meta-analysis
Victorri-Vigneau et al.	2018	*Opioid Antagonists for Pharmacological Treatment of Gambling Disorder: Are they Relevant?*	Did not perform meta-analysis
Zucchella et al.	2020	*Non-invasive Brain Stimulation for Gambling Disorder: A Systematic Review*	Did not perform meta-analysis

Table of excluded gaming reviews (n=10)

Author	Year	Title	Study type	Reason(s) for exclusion
Green et al.	2020	*Avatar- and self-related processes and problematic gaming: A systematic review*	Systematic review	Exclude on intervention
Király et al.	2018	*Policy responses to problematic video game use: A systematic review of current measures and future possibilities*	Systematic review	Exclude on intervention
Kurnaz et al.	2023	*Are CBT-based interventions effective for pathologic technology use? A meta-analysis of experimental studies*	Meta-analysis	Exclude on population
Lemos et al.	2014	*Internet and video game addictions: A cognitive behavioral approach*	Systematic review	Exclude on intervention

Search #	Year	Title	Study type	Reason(s) for exclusion
Lopez-Fernandez et al.	2016	*Video game addiction: Providing evidence for Internet gaming disorder through a systematic review of clinical studies*	Systematic review	Exclude on intervention
Maset-Sánchez et al.	2022	*How effective are psychological treatments for Internet gaming disorder? An umbrella review*	Umbrella review	Exclude on study design
Pallesen et al.	2015	*Treatment of video game addiction – A systematic review*	Systematic review	Exclude on language
Seo et al.	2021	*A Literature Review on the Efficacy and Related Neural Effects of Pharmacological and Psychosocial Treatments in Individuals with Internet Gaming Disorder*	Literature review	Exclude on study design
Zajac et al.	2017	*Treatments for Internet gaming disorder and Internet addiction: A systematic review*	Systematic review	Exclude on overlap (100%) – studies included in updated review
Zhuang et al.	2023	*Longitudinal modifiable risk and protective factors of internet gaming disorder: A systematic review and meta-analysis*	Meta-analysis	Exclude on intervention

Table of excluded addiction reviews (n=37)

Author	Year	Title	Reason(s) for exclusion
Archer et al.	2020	*Community reinforcement and family training and rates of treatment entry: a systematic review*	Addictive disorders – exclude on intervention – treatment entry rates only
Anderson et al.	2021	*Cognitive boosting interventions for impulsivity in addiction: a systematic review and meta-analysis of cognitive training, remediation and pharmacological enhancement*	Other addictive disorders – substance use disorder
Asevedo et al.	2014	*Systematic review of N-acetylcysteine in the treatment of addictions*	Other addictive disorders – substance use disorder. One study included on gambling is included in more recent reviews.
Ayub et al.	2023	*Treatment Modalities for Internet Addiction in Children and Adolescents: A Systematic Review of Randomized Controlled Trials (RCTs)*	Other addictive disorders – Internet addiction. Three studies evaluated gaming disorder, and all three are included in the umbrella review on gaming.
Boumparis et al.	2022	*Internet-based interventions for behavioral addictions: A systematic review*	Addictive disorders – the included studies on gambling are included in the umbrella review on gambling.
Brandtner et al.	2022	*A preregistered, systematic review considering mindfulness-based interventions and neurofeedback for targeting affective and cognitive processes in behavioral addictions*	Addictive disorders – reducing mental distress and craving reactions. The studies on gambling and gaming are included in the results of the umbrella reviews.

Author	Year	Title	Reason(s) for exclusion
Chang et al.	2022	*The Comparative Efficacy of Treatments for Children and Young Adults with Internet Addiction/Internet Gaming Disorder: An Updated Meta-Analysis*	Addictive disorders – primary studies on Internet addiction, only not specific to gaming
Chebli et al.	2016	*Internet-Based Interventions for Addictive Behaviours: A Systematic Review*	Other addictive disorders, e.g. smoking, alcohol – excluding gambling and gaming
DiClemente et al.	2017	*Motivational interviewing, enhancement, and brief interventions over the last decade: A review of reviews of efficacy and effectiveness*	Addictive disorders – other substance abuse and gambling. One primary study on gambling is already included in the umbrella review.
Fernandez et al.	2020	*Short-term abstinence effects across potential behavioral addictions: A systematic review*	Other addictive disorders – the primary studies included on gambling and gaming are already included in the umbrella review.
Gioia et al.	2019	*Treatment of Internet addiction and Internet gaming disorder in adolescence: A systematic review*	Other addictive disorders – the primary studies included on gambling and gaming are already included in the umbrella review.
Goslar et al.	2020	*Treatments for internet addiction, sex addiction and compulsive buying: A meta-analysis*	Other addictive disorders – not gambling or gaming

Author	Year	Title	Reason(s) for exclusion
Lam et al.	2016	*eHealth Intervention for Problematic Internet Use (PIU)*	Three studies included – one on smartphone addiction and two on gaming are included in the umbrella review.
Langener et al.	2021	*Clinical Relevance of Immersive Virtual Reality in the Assessment and Treatment of Addictive Disorders: A Systematic Review and Future Perspective*	Other addictive disorders – one study on gambling is already included in umbrella review.
Lee et al.	2022	*Effects of auriculotherapy on addiction: a systematic review*	Other addictive disorders – opioids, alcohol, cocaine. One study on gambling is included in the umbrella review.
Liverpool et al.	2020	*Engaging Children and Young People in Digital Mental Health Interventions: Systematic Review of Modes of Delivery, Facilitators, and Barriers*	Exclude on intervention. Digital treatments for broad mental health conditions only. No gambling or gaming interventions reported.
Malinauskas et al.	2019	*A meta-analysis of psychological interventions for Internet/smartphone addiction among adolescents*	Other addictive disorders (Internet/ smartphone addiction, excluding gambling or gaming)
Makani et al.	2017	*Role of Repetitive Transcranial Magnetic Stimulation (rTMS) in Treatment of Addiction and Related Disorders: A Systematic Review*	Other addictions – primary studies on gambling are included in the umbrella review.

Author	Year	Title	Reason(s) for exclusion
Mouaffak et al.	2017	*Naltrexone in the Treatment of Broadly Defined Behavioral Addictions: A Review and Meta-Analysis of Randomized Controlled Trials*	Addictive disorders – three studies assessed naltrexone's effectiveness in the treatment of pathological gambling and are included in the umbrella review.
Naish et al.	2018	*Effects of neuromodulation on cognitive performance in individuals exhibiting addictive behaviors: A systematic review*	Other addictive disorders – studies on gambling are included in the umbrella review.
Park et al.	2022	*Content and Effectiveness of Web-Based Treatments for Online Behavioral Addictions: Systematic Review*	Other addictive disorders – studies on gambling and gaming are included in the umbrella review.
Sancho et al.	2018	*Mindfulness-Based Interventions for the Treatment of Substance and Behavioral Addictions: A Systematic Review*	Other addictive disorders – studies on gambling are included in the umbrella review.
Sauvaget et al.	2015	*Transcranial direct current stimulation (tDCS) in behavioral and food addiction: a systematic review of efficacy, technical, and methodological issues*	Addictive disorder (eating disorder only)
Saxton et al.	2021	*The efficacy of Personalized Normative Feedback interventions across addictions: A systematic review and meta-analysis*	Other addictive disorders – three studies on gambling are included in the umbrella review.
Segawa et al.	2020	*Virtual Reality (VR) in Assessment and Treatment of Addictive Disorders: A Systematic Review*	Other addictive disorders – one study on gambling is included in the umbrella review.

Author	Year	Title	Reason(s) for exclusion
Throuvala et al.	2019	*School-based Prevention for Adolescent Internet Addiction: Prevention is the Key. A Systematic Literature Review*	Other addictive disorders (mainly Internet addiction) – the studies on gaming addiction are included in the umbrella review.
Weinsztok et al.	2021	*Delay Discounting in Established and Proposed Behavioral Addictions: A Systematic Review and Meta-Analysis*	Other addictive disorders (mainly Internet addiction) – the studies on gambling addiction are included in the umbrella review.
Xu et al.	2021	*A review of psychological interventions for internet addiction*	Other addictive disorders – the studies on gambling and gaming are included in the umbrella review.
Zajac et al.	2017	*Treatments for Internet gaming disorder and Internet addiction: A systematic review*	Addictive disorders – 100% overlap with 2021 systematic review
Zhang et al.	2022	*Effects of different interventions on internet addiction: A meta-analysis of random controlled trials*	Other addictive disorders – Internet, and did not subgroup by gambling or gaming
Zhu et al.	2023	*Effects of different interventions on internet addiction: a systematic review and network meta-analysis*	Other addictive disorders – Internet, and did not subgroup by gambling or gaming

Appendix 4. Overlap of primary research studies

Table of overlap, primary studies, pharmacological interventions – gambling

Author(s)	Dowling, 2022 (n=17)	Goslar, 2019 (n=39)	Ioannidis, 2023 (n=16)	Pallesen, 2007 (n=16)	Bartley, 2013 (n=14)	Duplicate
Alho et al., 2022			X			
Berlin et al., 2013	X	X	X		X	√
Black, 2007a	X	X	X		X	√
Black et al., 2011		X				
Blanco, 2002	X	X		X	X	√
Carlbring et al., 2012						
Dannon, 2005a	X	X	X	X		√
Dannon, 2005b	X	X		X		√
Dannon et al., 2005c		X				
Egorov, 2017		X				
Erevik et al., 2020						
Fong et al., 2008	X	X	X		X	√
Grant and Potenza, 2006				X		
Grant et al., 2003	X	X	X	X	X	√
Grant et al., 2006	X	X	X	X	X	√

Table of overlap, primary studies, pharmacological interventions – gambling (continued)

Author(s)	Dowling, 2022 (n=17)	Goslar, 2019 (n=39)	Ioannidis, 2023 (n=16)	Pallesen, 2007 (n=16)	Bartley, 2013 (n=14)	Duplicate
Grant et al., 2008a	X	X			X	√
Grant et al., 2010b	X	X	X		X	√
Grant et al., 2013		X				
Grant et al., 2014b		X				
Grant et al., 2024			X			
Hollander, 1998		X				
Hollander, 2005a	X	X		X		√
Hollander et al., 2000	X	X	X	X	X	√
Kim et al., 2001a	X	X	X	X	X	√
Kim et al., 2002	X	X	X	X	X	√
Kovanen et al., 2016		X	X			√
Lahti et al., 2010		X				
McElroy et al., 2008	X	X	X		X	√
Myrseth et al., 2011		X				
Myrseth et al., 2013						
Rosenberg, 2013	X					
Saiz-Ruiz et al., 2005	X	X		X	X	√

Table of overlap, primary studies, psychological interventions – gambling

Author(s)	Augner, 2022 (n=11)	Eriksen, 2023 (n=30)	Goodin g, 2009 (n=25)	Goslar, 2019 (n=39	Maynard, 2018 (n=7)	Pallesen, 2005 (n=22)	Peter, 2019 (n=11)	Pfund, 2023 (n=9)	Pfund, 2020 (n=14)	Quilty, 2019 (n=7)	Cowlishaw et al., 2012 (n=14)	Yakovenko, 2015 (n=6)	Duplicate
Abbott et al., 2017		X											
Black, 2004				X									
Black et al., 2007b				X									
Black et al., 2008				X									
Blackman et al., 1989						X							
Blaszczynski et al., 2005			X		X								√
Boudreault et al., 2017		X						X					√
Breen et al., 2001			X										
Bücker et al., 2018	X												
Bücker et al., 2021		X											
Canale et al., 2016	X												
Carlbring & Smit, 2008		X						X					√
Carlbring et al., 2010								X			X		√
Casey et al., 2017	X	X						X					√
Celio and Lisman, 2014							X						
Cunningham et al., 2009							X						
Cunningham et al., 2012							X						
Cunningham et al., 2019		X											
De Brito et al., 2017				X									
Diskin and Hodgins, 2009									X	X	X	X	√
Doiron and Nicki, 2007			X										
Dowling, 2006					X								
Dowling et al., 2007		X	X					X	X		X		√
Echeburua et al., 1996			X			X							√
Echeburua et al., 2000			X										
Freidenberg et al., 2002			X										
Gay et al., 2017													
Grant et al., 2007				X									
Grant et al., 2008b				X									
Grant et al., 2009		X			X			X	X		X		√
Grant et al., 2010a				X									
Grant et al., 2014a				X									
Hand, 1998						X							

Table of overlap, primary studies, psychological interventions – gambling

Author(s)	Augner, 2022 (n=11)	Eriksen, 2023 (n=30)	Goodin g, 2009 (n=25)	Goslar, 2019 (n=39	Maynard, 2018 (n=7)	Pallesen, 2005 (n=22)	Peter, 2019 (n=11)	Pfund, 2023 (n=9)	Pfund, 2020 (n=14)	Quilty, 2019 (n=7)	Cowlishaw et al., 2012 (n=14)	Yakovenko, 2015 (n=6)	Duplicate
Harris & Mazmanian, 2016									X				
Hodgins et al., 2001			X			X	X					X	√
Hodgins et al., 2004			X			X						X	√
Hodgins et al., 2009							X					X	√
Hodgins et al., 2019	X	X											√
Hopper, 2008													
Jiménez-Murcia et al., 2007			X										
Jonas et al., 2020	X	X											√
Koller, 1972						X							
Korman et al., 2008		X			X								√
LaBrie et al., 2012													
Ladouceur et al., 1998			X										
Ladouceur et al., 2001		X	X			X			X		X		√
Ladouceur et al., 2003		X	X			X			X		X		√
Larimer et al., 2011		X					X		X	X			√
Lee and Awosoga, 2015		X											
Lesieur and Blume, 1991			X			X							√
Luquiens et al., 2016	X	X											√
McAfee et al., 2020		X											
McConaghy et al., 1983			X		X	X							√
McConaghy et al., 1988					X	X							√
McConaghy et al., 1991			X			X							√
McIntosh et al., 2016		X											
Marceaux & Melville, 2011		X							X		X		√
Martens et al., 2015							X						√
Melville et al., 2004a		X	X			X			X		X		√
Melville et al., 2004b		X	X								X		√
Milton et al., 2002			X			X							√
Myrseth et al., 2009		X											
Neighbors et al., 2015							X						
Oei et al., 2010								X	X		X		√
Oei et al., 2017		X						X					√
Pallanti et al., 2002a				X									

Table of overlap, primary studies, psychological interventions – gambling

Author(s)	Augner, 2022 (n=11)	Eriksen, 2023 (n=30)	Goodin g, 2009 (n=25)	Goslar, 2019 (n=39	Maynard, 2018 (n=7)	Pallesen, 2005 (n=22)	Peter, 2019 (n=11)	Pfund, 2023 (n=9)	Pfund, 2020 (n=14)	Quilty, 2019 (n=7)	Cowlishaw et al., 2012 (n=14)	Yakovenko, 2015 (n=6)	Duplicate
Pallanti et al., 2002b				X									
Petry et al., 2006		X	X						X		X		√
Petry et al., 2008		X	X				X		X	X	X	X	√
Petry et al., 2009		X					X		X	X	X	X	√
Petry et al., 2016		X					X		X	X			√
Ravindran & Telner, 2006				X									
Robson et al., 2002						X							
Rosenberg et al., 2013													
Salerno et al., 2022													
Schwartz & Linder, 1992						X							
So et al., 2020	X	X											√
Stinchfield & Winters, 1996						X							
Stinchfield & Winters, 2001						X							
Sylvain et al., 1997		X	X			X			X		X		√
Toneatto, 2016										X			
Toneatto et al., 2009				X						X			√
Toneatto et al., 2014					X								
Watson, 2012													
Wittekind et al., 2019	X												
Wong et al., 2015		X						X					√
Wulfert et al., 2003						X							
Wulfert et al., 2006			X										
Zimmerman et al., 2002				X									

Table of overlap, primary studies, pharmacological interventions – gaming

Author(s)	Chen et al., 2023 (n=7)	De Sá, 2023 (n=12)	Kim, 2022 (n=17)	Wang, 2023 (n=43)	Zajac, 2020 (n=22)	Danielsen, 2024 (n=37)	King, 2018 (n=30)	Lampro-poulou, 2022 (n=16)	Stevens, 2021 (n=13)	Duplicate
Bae, 2018		X		X	X					√
Bipeta et al., 2015							X			
Dell'Osso et al., 2008							X			
Han, 2009		X			X		X			√
Han et al., 2010a							X			
Han, 2010b		X		X	X					√
Kim, 2017		X								
Lim, 2016		X								
Park, 2016a		X		X	X	X				√
Park, 2017		X		X						√
Park, 2018		X								
Song, 2016		X		X	X	X				√

Table of overlap, primary studies, psychological interventions – gaming

Author(s)	Chen et al., 2023 (n=7)	De Sá, 2023 (n=12)	Kim, 2022 (n=17)	Wang, 2023 (n=43)	Zajac, 2020 (n=22)	Danielsen, 2024 (n=37)	King, 2018 (n=30)	Lampro-poulou, 2022 (n=16)	Stevens, 2021 (n=13)	Duplicate
Brandhorst, 2022				X						
Cao et al., 2007							X		X	√
Choi and Son, 2011			X							
Deng, 2017			X	X		X				√
Du, 2021	X							X		√
Du et al., 2010							X		X	√
Ge et al., 2011							X			
González-Bueso, 2018				X	X			X		√
Han, 2018								X		
Han, 2012b				X	X					√
He, 2021			X	X						√
Huang, 2010	X					X				√
Hulquist, 2022				X						
Jeong, 2012							X			
Ji, 2023				X						
Jing et al., 2010							X		X	√

Table of overlap, primary studies, psychological interventions – gaming (continued)

Author(s)	Chen et al., 2023 (n=7)	De Sá, 2023 (n=12)	Kim, 2022 (n=17)	Wang, 2023 (n=43)	Zajac, 2020 (n=22)	Danielsen, 2024 (n=37)	King, 2018 (n=30)	Lampro-poulou, 2022 (n=16)	Stevens, 2021 (n=13)	Duplicate
Ju et al., 2011			X							
Kang, 2010			X	X						√
Kim, 2013				X	X			X		√
King, 2017					X					
Kuriala et al., 2020	X		X	X		X				√
Lee, 2016							X	X		√
Lee and Son, 2008			X			X	X		X	√
Lee et al., 2013							X			
Li, 2017			X	X	X	X				√
Lee and An, 2002			X							
Li and Wang, 2013a							X			
Li and Wang, 2013b				X	X			X	X	√
Lindenberg, 2022						X				
Liu et al., 2020			X							
Mannikko, 2021				X						
Narullita, 2021				X						
Palleson, 2015				X	X			X		√
Pyo and Lee, 2004			X							
Qiao, 2019	X									
Santos et al., 2016							X		X	√
Sakuma, 2017				X	X		X	X	X	√
Sharma, 2022				X						
Shek et al., 2009							X			
Shin, 2021				X						
Szász-Janocha, 2020								X		
Thorens et al., 2014							X			
Torres-Rodríguez, 2018			X	X	X			X		√
Wartberg et al., 2014							X		X	√
Wolfing et al., 2014							X		X	√
Wolfling, 2019	X		X	X		X				√
Young, 2007							X		X	√
Young, 2013							X		X	√
Yao, 2017				X	X					√
Zhao, 2022				X						
Zhang, 2016a	X		X		X	X				√
Zhang, 2016b			X							
Zhu et al., 2012							X			

Table of overlap, other primary studies – gaming

Author(s)	Chen et al., 2023 (n=7)	De Sá, 2023 (n=12)	Kim, 2022 (n=17)	Wang, 2023 (n=43)	Zajac, 2020 (n=22)	Danielsen, 2024 (n=37)	King, 2018 (n=30)	Lampro-poulou, 2022 (n=16)	Stevens, 2021 (n=13)	Duplicate
Apisitwasana et al., 2018						X				
Bonnaire et al., 2019						X				
Brailovskaia et al., 2022						X				
Cao et al., 2007						X				
Chang, 2020								X		
Evans et al., 2018						X				
Hong, 2020				X		X				√
Jeong, 2021				X		X				√
Keum, 2022				X						
Kim, 2008							X			
Krossbakken et al., 2018						X				
Lee, 2018a				X	X					√
Li et al., 2018b						X				
Lee and An, 2021	X			X		X				√
Liu, 2015							X	X		√
Maden, 2022						X				
Mumcu et al., 2021						X				
Ortega-Barón, 2021						X	X	X	X	√
Su et al., 2011							X			
Shin et al., 2015							X			
Walther, 2014						X				
Wang et al., 2022						X				
Wu Yan and Han, 2007							X			
Wu, 2021				X						
Zamanian et al., 2020						X				
Zheng, 2022a			X	X		X				√

Appendix 5. AMSTAR 2 quality assessment

Quality assessment of included studies – gambling addiction (n=18)

Questions highlighted in bold are critical domains.

AMSTAR 2 item	Pallesen, 2005	Pallesen, 2007	Peter, 2019	Pfund, 2023	Pfund, 2020	Quilty, 2019	Yakovenko, 2015	Cowlishaw 2012	Bartley, 2013
1-Did the research questions and inclusion criteria for the review include the components of PICO?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
2-Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review, and did the report justify any significant deviations from the protocol?	**No**	**No**	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**Yes**	**No**
3-Did the review authors explain their selection of the study designs for inclusion in the review?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4-Did the review authors use a comprehensive literature search strategy?	**No**	**Partial yes**	**Yes**	**Partial yes**	**Partial yes**	**Yes**	**Yes**	**Yes**	**Partial yes**
5-Did the review authors perform the study selection in duplicate?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No
6-Did the review authors perform the data extraction in duplicate?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No
7-Did the review authors provide a list of excluded studies and justify the exclusions?	**Yes**	**No**	**No**	**No**	**No**	**No**	**No**	**Yes**	**No**
8-Did the review authors describe the included studies in adequate detail?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9-Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review?	**No**	**No**	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**No**

Quality assessment of included studies – gambling addiction (n=18)

Questions highlighted in bold are critical domains.

(continued)

AMSTAR 2 item	Pallesen, 2005	Pallesen, 2007	Peter, 2019	Pfund, 2023	Pfund, 2020	Quilty, 2019	Yakovenko, 2015	Cowlishaw 2012	Bartley, 2013
10-Did the review authors report on the sources of funding for the studies included in the review?	**No**	**No**	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**No**	**No**
11-If a meta-analysis was performed, did the review authors use appropriate methods for a statistical combination of the results?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
12-If a meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis?	No	No	No	Yes	Yes	Yes	Yes	Yes	No
13-Did the review authors account for RoB in individual studies when interpreting/ discussing the results of the review?	**No**	**No**	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**No**
14-Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
15-If they performed a quantitative synthesis, did the review authors carry out an adequate investigation of publication bias (small-study bias) and discuss its likely impact on the results of the review?	**Yes**	**No**	**No**	**No**	**No**	**Yes**	**Yes**	**Yes**	**No**
16-Did the review authors report any potential sources of conflict of interest, including any funding that they received for conducting the review?	No	No	Yes (none reported)	Yes	Yes	Yes (disclosed funding, with no conflict of interest)	Yes	Yes	Yes
Overall quality of study	**Critically low**	**Critically low**	**Critically low**	**Critically low**	**Low**	**Low**	**Low**	**Low**	**Critically low**

Quality assessment of included studies – gambling addiction (continued)

Questions highlighted in bold are critical domains.

AMSTAR 2 item	Augner, 2022	Del Mauro, 2023	Dowling, 2022	Eriksen, 2023	Gooding, 2009	Goslar 2019	Goslar 2017	Ioannidis 2024	Maynard 2018
1-Did the research questions and inclusion criteria for the review include the components of PICO?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2-Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review, and did the report justify any significant deviations from the protocol?	**Partial yes**	**No**	**Yes**	**Yes**	**No**	**No**	**No**	**No**	**Yes**
3-Did the review authors explain their selection of the study designs for inclusion in the review?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4-Did the review authors use a comprehensive literature search strategy?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
5-Did the review authors perform the study selection in duplicate?	Yes	Yes	Yes	Yes	No	Yes	Yes	No	No
6-Did the review authors perform the data extraction in duplicate?	Yes	Yes	Yes	Yes	No	Partial yes	Partial yes	Yes	Yes
7-Did the review authors provide a list of excluded studies and justify the exclusions?	**No**	**Yes**	**Yes**	**Yes**	**No**	**No**	**No**	**No**	**Yes**
8-Did the review authors describe the included studies in adequate detail?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9-Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
10-Did the review authors report on the sources of funding for the studies included in the review?	**No**	**No**	**Yes**	**No**	**No**	**No**	**No**	**No**	**No**

Quality assessment of included studies – gambling addiction (continued)

Questions highlighted in bold are critical domains.

AMSTAR 2 item	Augner, 2022	Del Mauro, 2023	Dowling, 2022	Eriksen, 2023	Gooding, 2009	Goslar 2019	Goslar 2017	Ioannidis 2024	Maynard 2018
11-If a meta-analysis was performed, did the review authors use appropriate methods for a statistical combination of the results?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
12-If a meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
13-Did the review authors account for RoB in individual studies when interpreting/discussing the results of the review?	**Yes**	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
14-Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
15-If they performed a quantitative synthesis, did the review authors carry out an adequate investigation of publication bias (small-study bias) and discuss its likely impact on the results of the review?	**Yes**	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
16-Did the review authors report any potential sources of conflict of interest, including any funding that they received for conducting the review?	Yes (none reported)	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Overall quality of study	**Critically low**	**Critically low**	**High**	**Low**	**Critically low**	**Critically low**	**Critically low**	**Critically low**	**Low**

AMSTAR 2 quality assessment for each included systematic review – gaming addiction

Quality assessment of included studies – gaming addiction (n=9)

Questions highlighted in bold are critical domains.

AMSTAR 2 item	Chen, 2023	De Sá, 2023	Danielsen, 2024	Kim, 2022	King, 2017	Lampro-poulou, 2022	Stevens, 2019	Zajac, 2020	Wang, 2023
1-Did the research questions and inclusion criteria for the review include the components of PICO?	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
2-Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review, and did the report justify any significant deviations from the protocol?	**No**	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**Yes**	**No**	**Yes**
3-Did the review authors explain their selection of the study designs for inclusion in the review?	No	Yes	Yes	Yes	Partial yes	No	Partial yes	Yes	Yes
4-Did the review authors use a comprehensive literature search strategy?	**Partial yes**	**Yes**	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**No**	**Yes**
5-Did the review authors perform the study selection in duplicate?	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes
6-Did the review authors perform the data extraction in duplicate?	Yes	Yes	Yes	No	No	Yes	Yes	No	Yes
7-Did the review authors provide a list of excluded studies and justify the exclusions?	**No**	**Yes**	**Yes**	**No**	**No**	**No**	**Yes**	**Yes**	**Yes**
8-Did the review authors describe the included studies in adequate detail?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9-Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**No**	**Yes**
10-Did the review authors report on the sources of funding for the studies included in the review?	**No**	**No**	**Yes**	**No**	**No**	**No**	**Partial yes**	**No**	**No**

AMSTAR 2 quality assessment for each included systematic review – gaming addiction (continued)

Quality assessment of included studies – gaming addiction (n=9)

Questions highlighted in bold are critical domains.

AMSTAR 2 item	Chen, 2023	De Sá, 2023	Danielsen, 2024	Kim, 2022	King, 2017	Lampro-poulou, 2022	Stevens, 2019	Zajac, 2020	Wang, 2023
11-If a meta-analysis was performed, did the review authors use appropriate methods for a statistical combination of the results?	No meta-analysis	No meta-analysis	Yes	Yes	No	No	Yes	No	Yes
12-If a meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis?	No meta-analysis	No meta-analysis	Yes	Yes	No	No meta-analysis	Yes	No	Yes
13-Did the review authors account for RoB in individual studies when interpreting/discussing the results of the review?	**Yes**	**Yes**	**Yes**	**No**	**No**	**No**	**Yes**	**No**	**Yes**
14-Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
15-If they performed a quantitative synthesis, did the review authors carry out an adequate investigation of publication bias (small-study bias) and discuss its likely impact on the results of the review?	**No**	**Yes**	**Yes**	**Yes**	**No**	**No**	**Yes**	**No**	**Yes**
16-Did the review authors report any potential sources of conflict of interest, including any funding that they received for conducting the review?	Yes	No	Yes	Yes	No	No funding No conflict interest	Yes	Yes re: funding only	Yes
Overall quality of study	**Critically low**	**Low**	**High**	**Critically low**	**Critically low**	**Critically low**	**Moderate**	**Critically low**	**Low**

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