

Gambling disorders

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Gambling disorders, including pathological gambling and problem gambling, have received increased attention from clinicians and researchers over the past three decades since gambling opportunities have expanded around the world. This Seminar reviews prevalence, causes and associated features, screening and diagnosis, and treatment approaches. Gambling disorders affect 0·2–5·3% of adults worldwide, although measurement and prevalence varies according to the screening instruments and methods used, and availability and accessibility of gambling opportunities. Several distinct treatment approaches have been favourably evaluated, such as cognitive behavioural and brief treatment models and pharmacological interventions. Although promising, family therapy and support from Gamblers Anonymous are less well empirically supported. Gambling disorders are highly comorbid with other mental health and substance use disorders, and a further understanding is needed of both the causes and treatment implications of this disorder.

Introduction

Gambling in one form or another has probably pervaded every culture—archaeologists have uncovered primitive dice made from the knucklebones of sheep (astralagi) in caves dating from 3500 BCE.¹ Gambling activities range from informal games of chance (eg, sports betting) to formalised and legal options, such as destination resort casinos and highly developed online gaming environments. Most recently, such legalised gambling is increasing in unprecedented amounts throughout the world. Even countries that do not offer gambling to its citizens for religious or cultural reasons sometimes allow the operation of casinos for foreign visitors (eg, Malaysia, China, and South Korea). The desire and willingness to wager money or other items of value on randomly established outcomes seems universal. Although most individuals participate in gambling as an enjoyable social activity, a small group of people become too seriously involved in terms of time invested and money wagered and they continue to gamble despite substantial and negative personal, social, family, and financial effects.

Diagnosis and evaluation

Diagnostic criteria, classification, and prevalence

Two categories of gambling disorders are salient in published work: pathological gambling and problem gambling. Pathological gambling is medically defined, with diagnostic criteria described in both the Diagnostic and Statistical Manual of Mental Disorders, 4th edition, text revision (DSM-IV-TR)² and the International Classification of Diseases, 10th revision (ICD-10)³ (panel 1).

Both classification systems summarise pathological gambling from an atheoretical perspective (ie, they list only objective and behavioural diagnostic criteria), and both classify pathological gambling within an impulse disorder section. The predominant diagnostic system of the two, however, is the DSM-IV concept of pathological gambling.⁴ Although several popular diagnostic instruments have been based on criteria from DSM-IV or earlier versions, there is little research examining the

reliability, validity, and classification accuracy of the criteria.⁵ The American Psychiatric Association is in the process of evaluating how pathological gambling might be classified in the fifth edition of DSM (panel 2).^{6,7,9}

The informally defined category of problem gambling is often reported in prevalence surveys and is typically seen as a less severe form of gambling disorder. Although this category is not included in either DSM-IV or ICD-10, it has been referenced extensively among several diagnostic instruments.

Prevalence rates for pathological and problem gambling from national surveys vary worldwide. For example, past 12-month rates of problem gambling range from 0·2% in Norway to 5·3% in Hong Kong.¹⁰ Reported rates of pathological gambling in the USA range from 0·4% to 1·1% of adults, with an additional 1–2% identified as problem gamblers.¹¹ Data from prevalence surveys indicate variability in rates of gambling disorders not only from differences in survey methods—such as the use of different screening techniques, timeframes (eg, reported past year problems, lifetime problems), administration format, and response rates¹²—but also as a result of variability associated with the availability and accessibility of gambling opportunities.¹³ However, in some cases, national prevalence rates are stable over time despite an increase in gambling opportunities,^{10,14} suggesting that some type of social adaptation might take place as gambling becomes less novel in a local environment.¹⁵

Search strategy and selection criteria

We searched PsycINFO and Medline from January, 2002, to June, 2010, using the search terms “gambling”, “gambling disorders”, “pathological gambling”, and “problem gambling” in combination with “diagnosis”, “assessment”, “treatment”, “therapy”, and “etiology.” In addition to citing original research articles in this Seminar, we have also cited and searched the reference lists of relevant and comprehensive review articles and book chapters. The articles chosen for inclusion were those deemed most relevant to the scope of this Seminar.

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Panel 1: Criteria for diagnosis of pathological gambling, according to DSM-IV-TR and ICD-10

DSM-IV-TR criteria²

- A Persistent and recurrent maladaptive gambling behaviour is indicated if the individual has five (or more) of the following:
- 1 Is preoccupied with gambling
 - 2 Needs to gamble with increasing amounts of money
 - 3 Has repeated unsuccessful efforts to control, cut back, or stop gambling
 - 4 Is restless or irritable when attempting to cut down or stop gambling
 - 5 Gambles as a way of escaping from problems or of relieving a dysphoric mood
 - 6 After losing money gambling, often returns another day to get even (ie, "chasing one's losses")
 - 7 Lies to conceal the extent of involvement with gambling
 - 8 Has committed illegal acts to finance gambling
 - 9 Has jeopardised or lost an important relationship, job, or educational or career opportunity because of gambling
 - 10 Relies on others to provide money to relieve a desperate financial situation caused by gambling
- B The gambling behaviour is not better accounted for by a manic episode

ICD-10 criteria³

- A Individuals have frequent and repeated episodes of gambling despite adverse consequences
- B Individuals put their jobs at risk, acquire large debts, and lie or break the law
- C Individuals have intense urges to gamble, which are difficult to control
- D Individuals have preoccupation with ideas and images of the act of gambling
- E Should be distinguished from gambling and betting (frequent gambling for excitement or in an attempt to make money), excessive gambling by manic patients, and gambling by sociopathic personalities

DSM-IV-TR=Diagnostic and Statistical Manual of Mental Disorders, 4th edition, text revision. ICD-10=International Classification of Diseases, 10th revision.

Screening and assessment instruments

A range of self-report and interview assessment methods have been developed for both community and clinical populations (for comprehensive reviews see Stinchfield⁵ and Hodgins¹⁶ and their colleagues). The most well known screening instrument is the South Oaks Gambling Screen (SOGS),¹⁷ which was based on DSM-III criteria.¹⁸ This assessment has been translated into several languages and can be administered in either self-report or interview format. The original test assessed lifetime pathological gambling, although parallel past-year and past-3-month versions were subsequently developed.^{19,20} The past-year self-report version has indicated good overall classification accuracy (0.96), with better sensitivity (0.99) than specificity (0.75),²¹ indicating that SOGS tends to more often identify false positives.

A briefer screening technique is the nine-item Problem Gambling Severity Index (a subscale of the Canadian Problem Gambling Index).²² This index assesses low-risk, moderate-risk, and problem gambling within the past year (panel 3), has been used as a clinical screening instrument, and is increasingly used in prevalence surveys around the world (eg, Australia,

Denmark, Iceland, South Africa, and the UK). The classification accuracy of the problem gambling category has had adequate sensitivity (0.83) and excellent specificity (1.0) with use of DSM-IV classification as the criterion.²²

A third screening instrument is the 17-item National Opinion Research Center DSM-IV Screen for Gambling Problems (NODS), which was originally developed for a US national gambling telephone survey and was based on past-year and lifetime DSM-IV diagnostic criteria for pathological gambling.²³ The total score is used to identify pathological gambling, and lower cutoffs indicate low-risk and problem gamblers. Positive psychometric information is available, although more data are needed to confirm the validity of the cutoffs in both clinical and non-clinical populations.^{20,23-25} A three-item short version of NODS, NODS CLiP¹¹ (panel 4), has had excellent sensitivity (0.94) and specificity (0.96) in US community samples. Whereas NODS CLiP provides screening for lifetime problems, a three-item Brief Biosocial Gambling Screen (BBGS;²⁶ figure) was recently developed with a reporting window from the past 12 months. The BBGS was derived by use of DSM-IV assessment items and data from the National Epidemiologic Survey of Alcohol and Related Conditions (NESARC²⁷). With excellent sensitivity (0.96) and specificity (0.99), BBGS holds promise as a practical implement with clinical use. Neither BBGS nor NODS CLiP has been cross-validated in other national samples or validated in clinical samples.

For a more comprehensive assessment, the Gambling Treatment Outcome Monitoring System (GAMTOMS)²⁸ is a multidimensional self-report or interview assessment instrument. GAMTOMS incorporates SOGS and also assesses various domains pertaining to treatment planning and outcome monitoring, including gambling frequency, mental health, financial problems, legal problems, and motivation. Additionally, this system has a ten-item DSM-IV measure that is relevant for diagnostic purposes. GAMTOMS has been used for several psychometric evaluations in clinical samples,²⁸ whereby DSM-IV categorical diagnosis of pathological gambling had good sensitivity (0.96) and specificity (0.95) for distinguishing clinician-diagnosed cases from non-cases, as well as good sensitivity (0.96) and specificity (1.0) distinguishing SOGS-positive cases from SOGS-negative cases.⁵ GAMTOMS also includes a follow-up version that measures treatment outcome via self-report.²⁸

Finally, gambling behaviour and expenditures can be reliably measured with a timeline follow-back interview adapted from a method used for individuals who have problems with alcohol.²⁹ Typically, pharmacological treatment trials rely on the clinician-administered Yale-Brown Obsessive Compulsive Scale Modified for Pathological Gambling³⁰ or the self-report Gambling Symptom Assessment Scale,³¹ both of which assess gambling urges and behaviour and have had excellent reliability and validity.

Causes and pathogenesis

Demographic, psychological, and biological associations

In the past two decades, researchers have identified many predictive risk factors and processes associated with the development of gambling disorders.^{4,32} A substantial body of empirical work indicates that particular demographic associations—including young age, male sex, non-white ethnic origin, low socioeconomic status, and divorced or separated marital status—are general risk factors that are associated with gambling problems.^{32,33} These findings, however, are often reported in an aggregated form, thereby failing to account for moderating variables, such as type of gambling activity. To briefly highlight this important point, the results from one study³⁴ indicated that, among other results, sports gamblers tended to be young men with high rates of addiction comorbidity, whereas slot machine gamblers tended to be older women with higher rates of psychiatric comorbidity and later onset of gambling.

Mental health comorbidity

Gambling disorders are highly comorbid with other psychiatric disorders.³² The strongest evidence base relates to substance use disorders. In NESARC,²⁷ the largest psychiatric epidemiology study undertaken so far, pathological gamblers had an increased risk of having a diagnosis of alcohol misuse in their lifetimes by a factor of six, and an increased risk of having a substance use disorder by a factor of 4.4 compared with non-gamblers. Additionally, rates of major depression and dysthymia were each about three times higher in pathological gamblers than in non-gamblers, whereas rates of a manic episode were eight times higher in gamblers. Moreover, generalised anxiety disorder, panic disorder, and specific phobias were each more than three times higher in gamblers, with social phobia twice as high a risk. Modules for obsessive-compulsive and post-traumatic stress disorders were not included in the NESARC study, and evidence for the comorbidity between those disorders with pathological gambling in other published studies is mixed. In the NESARC sample, pathological gamblers also had an increased risk of having a personality disorder by a factor of about eight.

In another large-scale US national survey of mental disorders—the National Comorbidity Survey Replication (NCS-R)³⁵—similar comorbidity rates of pathological gambling with psychiatric disorders were obtained. Of those with pathological gambling, the risk of having a substance use disorder was increased by 5.5 times, that for having a mood disorder was increased by 3.7 times, and that for having an anxiety disorder increased by 3.1 times. Although the bidirectional nature of the association between pathological gambling and psychiatric disorders is unclear, the NCS-R was the first study to obtain retrospective onset data, indicating that in pathological gamblers with a comorbid disorder, the onset of pathological gambling preceded the comorbid

Panel 2: The history and future of pathological gambling in DSM

Pathological gambling was formally introduced as a disorder of impulse control by the American Psychiatric Association in DSM-III in 1980.⁶ Since then, the criteria for pathological gambling have been modified twice: in 1987 with the publication of the revised DSM-III and then in 1994 with publication of DSM-IV. The criteria were left unchanged from DSM-IV to DSM-IV text revision.² Since the inception of pathological gambling in DSM, the criteria have been specifically modelled after psychoactive substance dependence criteria.⁷

Most recently, the Substance Use Disorders Workgroup of the American Psychiatric Association DSM committee⁸ has proposed several changes to the current DSM-IV² classification of pathological gambling and has received more than 400 comments on their proposed changes.⁹ First, the Workgroup has proposed to rename the pathological gambling disorder to disordered gambling and to reclassify the disorder from the section on impulse-control disorders not elsewhere classified into that on substance-related disorders (which is to be renamed as addiction and related disorders). To buttress their proposal, the Workgroup has cited 21 papers that take into account commonalities between pathological gambling and substance use disorders with regard to clinical expression, cause, comorbidity, biological dysfunction, genetic liability, and treatment. Most of the comments received by the Workgroup were in favour of moving pathological gambling to a section on addiction and related disorders.⁹ Second, with regard to diagnostic criteria, the Workgroup has proposed to eliminate the criterion “has committed illegal acts such as forgery, fraud, theft, or embezzlement to finance gambling”. Although the Workgroup lists only one study to support this proposal, other research indeed supports the notion that the illegal acts criterion is rarely endorsed in population surveys and adds little to classification accuracy.⁹ The final recommendation of the Workgroup is to lower the threshold necessary for a diagnosis of pathological gambling, whereby an individual would need to meet four or more of nine diagnostic criteria (rather than five or more of ten, as specified in DSM-IV). The Workgroup has cited three studies in support of lowering the current threshold to improve classification accuracy. Although some comments received by the Workgroup argued to reduce the number of criteria necessary for a diagnosis to even lower than four, such changes would more than double the prevalence rate of the disorder, could set a precedence for setting the level too low for future putative behavioural addictions that might be introduced in subsequent versions of DSM, and might more broadly undermine the system of psychiatric classification and serve as a disservice to individuals with substantial psychiatric distress.⁹

DSM=Diagnostic and Statistical Manual of Mental Disorders.

disorder 23.5% of the time, whereas pathological gambling followed the comorbid disorder 74.3% of the time. Results from the NCS-R also suggested that mood and anxiety disorders predicted the subsequent onset of pathological gambling. With regard to substance use disorders, pathological gambling more often predicted the subsequent onset of substance use disorders than vice versa.

Neurocognition

The behaviours that characterise problematic gambling (eg, chasing losses, preoccupation with gambling, inability to stop) are impulsive in that they are often premature, poorly thought out, risky, and result in deleterious long-term outcomes.³⁶ Deficits in aspects of inhibition, working memory, planning, cognitive flexibility, and time

Panel 3: Problem Gambling Severity Index

- 1 Thinking about the past 12 months, have you bet more than you could really afford to lose?
- 2 Still thinking about the past 12 months, have you needed to gamble with larger amounts of money to get the same feeling of excitement?
- 3 When you gambled, did you go back another day to try to win back the money you lost?
- 4 Have you borrowed money or sold anything to get money to gamble?
- 5 Have you felt that you might have a problem with gambling?
- 6 Has gambling caused you any health problems, including stress or anxiety?
- 7 Have people criticised your betting or told you that you had a gambling problem, regardless of whether or not you thought it was true?
- 8 Has your gambling caused any financial problems for you or your household?
- 9 Have you felt guilty about the way you gamble or what happens when you gamble?

Scores for the nine items are summed (never=0; sometimes=1; most of the time=2; almost always=3), and the results are interpreted as follows: 0=non-problem gambling; 1–2=low level of problems with few or no identified negative consequences; 3–7=moderate level of problems, leading to some negative consequences; ≥8=problem gambling with negative consequences and a possible loss of control.

Adapted from the Canadian Problem Gambling Index.²²

management or estimation are more common in individuals with pathological gambling than in healthy volunteers.^{37–45} In one neuroimaging study on inhibition in pathological gambling, decreased activation in the ventrolateral prefrontal cortex was reported in problem gamblers compared with healthy controls by use of the Stroop colour–word task.⁴⁶ Studies of patients, however, can often have confounds, such as treatments received and potential deleterious cognitive effects of comorbidities (eg, depression). Furthermore, these studies do not enable characterisation of the temporal association between the manifestation of cognitive deficits and clinically significant symptoms. These deficits could occur in people at risk before symptoms develop or could alternatively stem from the disorder itself, perhaps reflecting a secondary or incidental epiphenomenon.

Neurobiology

Increasing evidence implicates multiple neurotransmitter systems (eg, dopaminergic, serotonergic, noradrenergic, opioidergic) in the pathophysiology of gambling disorders. Dopamine is implicated in learning, motivation, and the salience of stimuli, including rewards. Alterations in dopaminergic pathways might underlie the seeking of rewards (ie, gambling) that trigger the release of dopamine and produce feelings of pleasure.⁴⁷ Neuroimaging research suggests that the dopaminergic mesolimbic pathway from the ventral tegmental area to the nucleus accumbens might be involved in pathological gambling. Neuroimaging studies in pathological gamblers have indicated diminished ventral striatum and ventromedial prefrontal cortex and ventrolateral prefrontal cortex activity during rewarding events suggestive of a blunted neurophysiological response to rewards and losses.^{48,49} Contrary

Panel 4: National Opinion Research Center DSM-IV Screen for Gambling Problems—three-item short version (NODS CLiP)

- Have you ever tried to stop, cut down, or control your gambling?
- Have you ever lied to family members, friends, or others about how much you gamble or how much money you lost on gambling?
- Have there ever been periods lasting 2 weeks or longer when you spent a lot of time thinking about your gambling experiences or planning out future gambling ventures or bets?

These screening items address problems of loss of control, lying, and preoccupation (CLiP). Positive response to any one item indicates likely problem or pathological gambling and the need for further assessment. Adapted from Toce-Gerstein and colleagues.⁵¹ DSM-IV=Diagnostic and Statistical Manual of Mental Disorders, 4th edition.

to what might be expected from dopamine involvement, antagonists at dopamine D2/D3 receptors enhance gambling-related motivations and behaviours in patients with pathological gambling⁵⁰ and have no effect in the treatment of pathological gambling.^{51,52} Further research is needed to clarify the precise role of dopamine in pathological gambling.

Evidence for serotonergic involvement in pathological gambling comes from preclinical research examining the effect of a serotonergic agonist in rats undertaking a gambling task.⁵³ A serotonergic agonist resulted in an inability to judge between expected outcomes on the basis of the relative likelihood and size of rewards and punishments.⁵³ Other support for dysfunction within the serotonergic system comes from human studies of pathological gamblers: decreased concentrations of platelet monoamine oxidase B (a peripheral marker of serotonergic function), low concentrations of serotonin metabolites (eg, 5-hydroxyindoleacetic acid) in the cerebrospinal fluid, and a euphoric response to serotonergic pharmacological challenge studies.⁵⁴

Genetic factors

Relatively few family history or genetics studies of pathological gambling have been designed with appropriate control groups. In one small family study of probands with pathological gambling, first-degree relatives of the probands had significantly higher lifetime rates of alcohol disorders, other substance use disorders, and depression than did control individuals.⁵⁵

Data from twin studies suggest a genetic contribution to gambling disorders.^{56–62} The genetic versus environmental contributions to pathological gambling can be estimated by comparing its concordance in identical (monozygotic) and fraternal (dizygotic) twin pairs. In a study of male twins that used the Vietnam Era Twin Registry,⁵⁷ 12–20% of the genetic variation in risk for pathological gambling and 3–8% of the nonshared

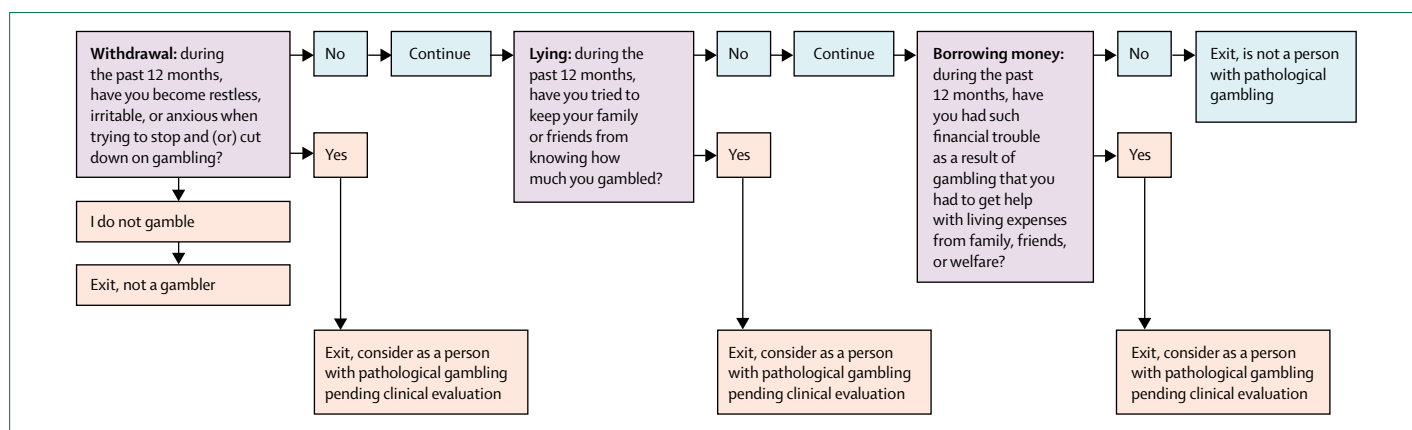


Figure: Brief Biosocial Gambling Screen
Adapted from Gebauer and colleagues.²⁶

environmental variation in risk for pathological gambling was accounted for by risk for alcohol use disorders. Two-thirds (64%) of the co-occurrence between pathological gambling and alcohol use disorders was attributable to genes that affect both disorders, suggesting overlap in the genetically transmitted underpinnings of both conditions. A follow-up study of female twins reported that the estimate of the proportion of variation in liability for disordered gambling attributable to genetics was 49% and that there was no evidence for shared environmental effects contributing to variation in disordered gambling liability.⁶¹

There are few molecular genetic studies of pathological gambling. The *D2A1* allele of the *D2* dopamine receptor gene (*DRD2*) increases in frequency from individuals with non-problematic gambling to those with pathological gambling and co-occurring pathological gambling and substance use disorders.⁶³ Other research has also implicated allelic variants of *DRD1* and *DRD3* as having an association with pathological gambling.^{64,65}

Environmental factors

Although many genes confer vulnerability, several environmental factors also contribute to developmental pathways of gambling disorders. The structural and situational characteristics of gambling activities (eg, accessibility to gambling, location and type of gambling establishment, size and number of prizes, and near-miss opportunities) are important factors involved in the maintenance of gambling behaviour.^{13,66} Additionally, rates of early negative childhood experiences, such as abuse and trauma, seem to be higher in individuals with gambling disorders than in social gamblers, with the severity of maltreatment being associated with the severity of gambling problems and an earlier age of gambling onset.^{67,68} Childhood exposure to gambling also probably affects gambling behaviour later in life, as suggested by reports of associations between gambling problems and parental gambling.^{69,70}

Integrative models

Two predominant integrative heuristic models have been proposed to explain the cause of gambling disorders: the biopsychosocial model^{71,72} and the pathways model.⁷³ The biopsychosocial model is essentially predicated on a cognitive-behavioural and diathesis-stress framework, whereby predisposing factors (eg, poor problem-solving and coping skills and genetic vulnerabilities) interact with early gambling experiences (eg, receiving large wins early, receiving a high proportion of small wins early) and adverse psychosocial experiences (eg, stressful life problems, boredom) to give rise to gambling disorders. Both the biopsychosocial and pathways models describe similar factors and processes involved in the development and maintenance of gambling problems. The major difference is that the biopsychosocial model assumes homogeneity of gambling disorders and the pathways model postulates heterogeneity of gambling disorders manifested as three main pathways leading to three subtypes of problem gamblers: behaviourally conditioned, emotionally vulnerable, and antisocial impulsivist. The behaviourally conditioned subtype is characterised by an absence of premorbid psychopathological changes and impaired control over gambling results from the effects of conditioning, distorted cognitions, and poor decision making associated with frequent exposure to gambling. These same environmental principles are involved in the cause of the other two subtypes, although premorbid pathological changes are a complicating factor in terms of motives for gambling and course of the disorder. The emotionally vulnerable subtype has pre-existing depression, anxiety, and poor coping and problem-solving skills, and a history of trauma and gambling helps to modulate affective states. The third subtype has pre-existing impulsivity, attentional difficulties, and antisocial features, and gambling serves as a risky and exciting activity. Clinical experience suggests that there is merit to taking into account the heterogeneity of gambling disorders, and descriptive validation of the pathways

model is beginning to accumulate for both adults⁷⁴ and adolescents.⁷⁵ Nevertheless, no longitudinal data are available to test the developmental aspects or treatment implications of the typology.

Natural and treatment-assisted recovery and support

Pathways to recovery

Prevalence surveys indicate that only a small proportion (<10%) of the individuals who have gambling disorders seek formal treatment.^{76,77} In a recent review⁷⁸ of perceived barriers to treatment seeking, the results of studies undertaken across five countries were similar. A desire to handle the problem on their own, shame, and denial were the most frequently described reasons for individuals not accessing treatment rather than perceived or actual treatment availability. Prevalence surveys have also reported that, despite the low rate of treatment seeking, many people have recovered from gambling problems—past-year prevalence rates of gambling disorders are consistently about two-thirds of the lifetime rates, suggesting a recovery rate of a third.^{79–81} Very little longitudinal research is available about the natural course of gambling disorders. However, available data suggest that, at the individual level, gambling problems are transient and episodic.^{82,83} Follow-up samples indicate that most recovered individuals have accomplished their recoveries without accessing formal treatment services,⁸⁰ which is consistent with what is reported for other addictive disorders.⁸⁴ In-depth interviews with convenience samples of recovered people reveal that their recovery strategies are practical and behaviour focused—including involvement in time-consuming activities that are incompatible with gambling and avoidance of conditioned cues to gamble (eg, gambling venues and information about betting odds).^{85,86} Similar recovery strategies are reported by individuals who have accessed treatment and those who recovered without the assistance of treatment.

The results of the study of the recovery process have important implications for our approach to dealing with gambling disorders. First, effects are needed to increase treatment uptake through, for example, public awareness and anti-stigma campaigns. Second, these findings have also bolstered research into brief treatment models aimed at promotion of a self-recovery process for individuals.

Brief treatment

Brief treatments are not necessarily seen as treatment by individuals who access them. In two randomised controlled trials, individuals who did not want to attend treatment, despite acknowledging a problem and meeting diagnostic criteria for pathological gambling, were specifically recruited.^{87–89} A telephone-based motivational interview contact combined with a mailed self-help cognitive-behavioural therapy workbook led to good outcomes over 12-month and 24-month follow-up periods. Motivational interviewing is a therapeutic style of

interacting with individuals to encourage them to focus on their personal reasons for needing to address problem behaviours, as well as to voice any factors that work against change. Resolution of people's natural ambivalence about change motivates them to take action. A similar motivational interviewing and cognitive-behavioural therapy intervention has been adapted to a web-based format in Sweden,⁹⁰ in which a therapist provides telephone support for individuals using online recovery materials. In a US randomised controlled study,⁹¹ a 5-min session of behavioural advice and four sessions of motivational enhancement plus cognitive-behavioural therapy were equally effective for reduction of gambling in individuals not seeking treatment and were more effective than one session of motivational interviewing alone or a no treatment control. The New Zealand telephone helpline service for problem gamblers uses a randomised controlled design to evaluate the relative effectiveness of various combinations of motivational interviewing, a workbook, and booster telephone calls. Telephone gambling helplines and websites that provide treatment referral or personal support are common in many countries (eg, the USA, Canada, Australia, and the UK) so development of evidence-based interventions with these methods is important. Another potential strategy for providing brief interventions is through gambling venue-based treatment referral and support services, which are increasingly being offered in venues such as casinos.

Psychosocial treatment

Various treatment models have been adapted for gambling disorders. In a meta-analysis,⁹² 22 randomised trials published between 1968 and 2004 were identified. In general, psychological treatments were more effective than no treatment, both after treatment (overall effect size 2.01) and at follow-up averaging 17 months later (overall effect size 1.59). Although the authors did not evaluate which specific types of treatments were more effective than others, most studies of treatment outcomes that were included in their meta-analysis were done within the behavioural, cognitive, and cognitive-behavioural formats. Another meta-analysis, which focused exclusively on the cognitive-behavioural treatment literature, included 25 studies.⁹³ Substantial variability in the outcomes were reported but, in general, post-treatment effects were positive for different types of therapy (eg, behavioural, and cognitive) and method of therapy (eg, individual, group, and self-directed). No randomised trials of inpatient treatment have yet been done.⁹⁴

Behavioural models summarise gambling disorders as learned patterns of reinforcement within a functional framework (ie, antecedents, behaviours, and consequences), and behavioural treatments focus on modifying one or more components of the functional relationship. Specifically, strategies include reducing avoidance, exposure to high-risk situations, behavioural experiments

to challenge distorted thoughts, and development of skills in various areas (eg, assertiveness, problem solving, and relaxation). In a review, the authors concluded that aversion therapies tend to be relatively less effective than imaginal desensitisation approaches.⁹⁴

Cognitive treatment models focus specifically on modifying distorted cognitions associated with gambling,⁷² including overestimating probabilities of winning, illusions of control over the outcome of a gamble, the belief that a win is due after a series of losses (ie, the gambler's fallacy), and memory biases in favour of remembering wins⁹⁵ (panel 5).

Although a few trials have evaluated the efficacy of a purely cognitive approach, the largest number and the most rigorously designed trials evaluate a combined cognitive-behavioural therapy model. Overall, although there is variability in outcomes, different research groups working in several languages in diverse areas of the world generally report positive effects.⁹² Some trials have recently examined the efficacy of motivational interviewing alone or in combination with cognitive-behavioural therapy interventions. Data from a recent Swedish trial⁹⁶ showed that group cognitive-behavioural therapy and an individual motivational interview intervention had equivalent outcomes and that both were superior to a wait list control. Results from two small trials indicated that the addition of motivational interviewing to cognitive-behavioural therapy reduced treatment attrition and improved outcomes.^{97,98} Dropout rates from psychosocial treatment are high so interventions that lead patients to complete treatment are potentially very valuable.

Psychopharmacological treatment

Although no drug has received regulatory approval in any jurisdiction as a treatment for gambling disorders, there have been 18 double-blind, placebo-controlled trials of various drugs (opioid antagonists, glutamatergic agents, antidepressants, and mood stabilisers) for the treatment of pathological gambling. A meta-analysis of randomised trials included 16 outcome studies, published between 2000 and 2006,⁹⁹ which revealed that, in general, pharmacological treatments were more effective than was placebo treatment (overall effect size 0.78). However, studies generally reported a particularly strong placebo effect, which would serve to lower the effect size of the drug, attrition rates were high in several of these trials, and several other studies have been published since 2006.

Given their ability to modulate dopaminergic transmission in the mesolimbic pathway, opioid receptor antagonists (naltrexone and nalmefene) have been investigated in the treatment of pathological gambling. Results from two double-blind, placebo-controlled studies of naltrexone and two multicentre double-blind, placebo-controlled trials of nalmefene suggest efficacy of opioid antagonists in reducing the intensity of urges to gamble, gambling thoughts, and gambling behaviour.¹⁰⁰⁻¹⁰³ Pooled analyses of individuals who responded to opioid

Panel 5: Distorted cognitions in gambling disorders

Magnification of gambling skill

- Overrating one's ability to win at gambling

Superstitious beliefs

- Talismanic superstitions include beliefs that the possession of certain objects increases the probability of winning (eg, ring, hat)
- Behavioural superstitions include beliefs that certain actions or rituals can increase the probability of winning (eg, playing only certain slot machines or placing smaller bets if they do not throw the dice themselves)
- Cognitive superstitions include beliefs that certain mental states can affect the probability of winning (eg, prayer, hope, positive expectancies)

Interpretative biases

- Attributional biases refer to the tendency to overestimate dispositional factors (eg, skills, abilities) to explain wins and to underestimate situational factors (eg, luck, probability)
- Gambler's fallacy refers to the belief that a win is due after a series of losses
- Chasing refers to the belief that the only way to recover financial loss is to continue to gamble
- Anthropomorphism is the tendency to attribute human characteristics to non-animate or non-human gambling objects (eg, slot machine, lottery card, bingo card, horses)
- Learning from losses refers to the belief that continuing to gamble is highly justifiable because losses are perceived as valuable learning experiences, which can ultimately lead to winning
- Hindsight bias refers to retrospectively evaluating gambling decisions as correct or incorrect on the basis of whether they lead to wins or losses

Temporal telescoping

- The belief that wins are actually nearer, temporally, than further, especially if the gambling is relying on superstitious behaviour or gambling systems to win; the gambler makes the additional assumption that they (rather than other gamblers) will win, even if other gamblers have also incurred serious losses and are expecting to win

Selective memory

- Selectively recalling wins, especially large ones, and having difficulty recalling losses

Predictive skill

- Making gambling decisions on the basis of interpretations or meanings assigned to subjectively salient or important cues; cues can be internal (eg, bodily perceptions, gut sensations, intuitions, feelings) or external (eg, omens, weather phenomena, serendipitous events) or behaviour by other gamblers

Illusions of control over luck

- Luck can be perceived as an important variable and regarded as an uncontrollable variable (ie, luck oscillates between periods of good and bad luck and cannot be manipulated directly), a controllable variable (ie, luck can be manipulated through superstitious behaviours or systems), a trait variable (ie, people are characteristically lucky with certain games and unlucky with others), or a contagion (ie, luck is affected by other areas of their life or by other people)

Illusory associations

- Perceiving illusory associations or assigning causality to salient features of the environment believed to be associated with gambling outcomes (eg, noticing more frequent winning at night, noticing that certain days of the week are more likely to lead to wins, believing that watching a sports game on television will favour a specific team)

Adapted from Toneatto.⁹⁵

antagonists indicated significant reduction in gambling urges, particularly in participants with a positive family history of alcohol dependence.¹⁰⁴

Because improvement in glutamatergic tone in the nucleus accumbens has been implicated in reducing the reward-seeking behaviour in addictions,¹⁰⁵ N-acetyl cysteine, an amino acid and glutamate modulator, has been studied in the treatment of pathological gambling.¹⁰⁶ N-acetyl cysteine had positive effects on urges and gambling behaviour.¹⁰⁶

Results from trials of the atypical antipsychotic olanzapine and a trial of bupropion, however, had no benefit over placebo.^{51,52,107} Finally, a non-treatment trial examined the effects of an atypical stimulant, modafinil, on pathological gamblers classified according to impulsivity.¹⁰⁸ Highly impulsive people had decreased motivation to gamble and less risky decision making, whereas people with low impulses had increased responses. The data from this study indicate a potential direction for pharmacological research in gambling disorders—examining the relative efficacy of different drug classes in individuals with related comorbid disorders (eg, mood, bipolar, anxiety, attention-deficit hyperactivity, and substance use). Thus far, there has been little research examining the effect of combining pharmacological and psychosocial treatments.⁹⁴ However, in one trial, individuals receiving cognitive-behavioural therapy for comorbid gambling and alcohol use disorders did equally well with naltrexone and placebo.¹⁰⁹ Finally, pharmacological studies with longer term follow-ups are needed. In an open-label discontinuation trial of 43 men fully responding to fluvoxamine, topiramate, bupropion, or naltrexone, most responders did not relapse during a 6-month drug-free follow-up period.¹¹⁰

Research on the pharmacological treatment of gambling disorders seems promising, particularly in the case of opioid antagonists. The table summarises typical doses and response rates from placebo-controlled trials. The studies, however, are small and of short duration. No study has examined whether certain individuals with pathological gambling would benefit differentially from

specific drugs, and no research has yet established who would benefit more from pharmacotherapy or cognitive-behavioural therapy.

Gamblers Anonymous

Gamblers Anonymous self-help groups were started in 1957 in Los Angeles, CA, USA, and are now operating in at least 55 countries worldwide.¹¹¹ Individuals use a programme of 12 steps and 12 traditions, modified from Alcoholics Anonymous, to acknowledge powerlessness over compulsive gambling and to remain gambling free. The groups promote a sense of common purpose and understanding and reinforce each consecutive day of abstinence from gambling. As with Alcoholics Anonymous, periods of success are marked with celebrations and rewards.

There are few outcome studies evaluating the effectiveness of Gamblers Anonymous, and well controlled efficacy research has not been done. Correlational data have indicated that individuals affiliated with Gamblers Anonymous have better gambling outcomes than do those who are not,¹¹² even when they are concurrently engaged in professional treatment.¹¹³ However, treatment outcome studies that have used referral to Gamblers Anonymous as a comparison condition to cognitive-behavioural treatment have indicated poor attendance of Gamblers Anonymous and outcomes.^{113,114}

Family therapy

Advances in family therapy interventions for treatment of substance abuse problems have been adapted for gambling disorders. A self-help workbook, a gambling adaptation of the Community Reinforcement and Family Therapy (CRAFT) model, has been evaluated in two randomised controlled trials.^{115,116} In CRAFT, concerned family members are trained to use behavioural principles to reinforce non-gambling behaviour in individuals who are not addressing their gambling problem. Although positive effects for family members and their gambling relatives were reported in both trials, the most recent trial also concluded that the behavioural principles were too complex for family members to implement without the support of a therapist.¹¹⁶ Moreover, in neither trial did the gambling relatives enter treatment because of the intervention, one of the main goals of CRAFT. A coping skill group therapy model developed for alcohol problems has also been evaluated for gambling. In a small randomised controlled trial, partners of individuals with gambling problems improved their ability to self-manage feelings of depression and anxiety.¹¹⁷ Finally, congruence couple therapy for gambling problems has been developed from Satir's family therapy approach. The therapeutic goal is to help individuals achieve congruence in intrapsychic, interpersonal, intergenerational, and spiritual dimensions. In an uncontrolled trial of 24 couples, positive effects on both gambling and the couple's relationships were reported.¹¹⁸ In summary, the

	Dose (mg per day)	Number of participants	Response rate for drug	Response rate for placebo
Naltrexone ^{100,101}	50–150	122	61.8%	34.2%
Nalmefene ^{102,103}	20–100	414	51.8%	46%
Fluvoxamine ⁹⁹	50–250	47	72%	48%
Paroxetine ⁹⁹	10–60	121	62.9%	39.7%
Sertraline ⁹⁹	50–150	60	68%	66%
Bupropion ¹⁰⁷	75–375	39	35.7%	47.1%
Olanzapine ^{51,52}	2.5–15	63	66.7%	71.4%

Data from double-blind, placebo-controlled studies. Table does not include studies using an open-label design followed by double-blind discontinuation; studies used various measures to assess response, and some studies were fixed-dose studies and others allowed for dose titration. Where two studies have been done with the same drug, the response rates reflect pooled means. In these cases, there was often one positive and one negative study, and therefore the results need to be interpreted in the context of each study's method.

Table: Studies of usefulness of drugs for pathological gambling

role of family therapy models in the treatment of gambling disorders remains to be studied but shows promise on the basis of this small amount of research.

Clinical factors and future directions

Despite the progress that has been made into development of effective treatments for gambling disorders, several unresolved clinical issues exist. As noted in this Seminar, there is substantial comorbidity of gambling disorders and mental and substance use disorders. How concurrent disorders should be addressed in gambling treatment is not well understood and has not been empirically studied.

The long debated factor of moderated drinking versus abstinence as the treatment goals in alcohol treatment has been raised in gambling treatment. Offering flexibility to individuals is seen to be a way to increase treatment-seeking and decrease treatment dropout. A recent uncontrolled trial of cognitive-behavioural therapy is the most systematic examination of this issue so far.¹⁹ Pathological gamblers were offered treatment with moderated gambling as the goal. Most participants shifted their goal to abstinence at some point during the 12 weeks of treatment. However, outcomes were equivalent for individuals who retained a moderated goal and individuals who ultimately were determined to quit. Notably, the dropout rates from therapy did not seem to be lower in this study than with studies of abstinence-oriented treatment. Future research is necessary to establish whether offering flexible goals increases treatment seeking.

Most of our progress in recognising and understanding gambling disorders has been made in the past 25 years. Our knowledge continues to evolve in parallel with a burgeoning availability of gambling opportunities. Internet gambling, for example, is providing around-the-clock home access to several types of gambling activities to an increasing number of people around the world. Thus, although substantial progress has been made, this evolution warrants, and is likely to encourage, more innovative research into gambling disorders and its translation into clinical progress.

Contributors

All authors contributed equally to this manuscript.

Conflicts of interest

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