

PROBLEM GAMBLING

A NARRATIVE REVIEW OF IMPORTANT POLICY-RELEVANT ISSUES

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ABBREVIATIONS

CAPI	Computer-assisted personal interviewing
CBT	Cognitive Behavioural Therapy
CM	Crosswise Models
DSM-IV	American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders IV
ESPAD	European School Survey Project on Alcohol and Other Drugs
GGR	Gross Gambling Revenue
HRB	Health Research Board
PG	Problem Gambling
PGSI	Problem Gambling Severity Index
RRT	Random response technique
SCG	Social Casino Games
SOGS	South Oaks Gambling Screen

EXECUTIVE SUMMARY

Gambling is a large and growing industry. With that growth, there has also been growing concern about the potential harms that can arise from problem gambling. In late 2022, new legislation was introduced in Ireland to provide for more stringent regulation of the gambling industry and to establish an independent regulator, the Gambling Regulatory Authority of Ireland (GRAI).

This review summarises and evaluates evidence from international research that is relevant to a number of policy questions. In doing so, it also identifies where evidence is deficient or lacking, to highlight some important and fruitful avenues for future research. The findings of this review for each issue are summarised below.

THE PREVALENCE OF PROBLEM GAMBLING

- Problem gambling and its most severe form, gambling disorder, are defined based on the presence of symptoms and behaviours such as lying to conceal gambling, repeated unsuccessful efforts to reduce gambling, and needing to gamble with increasingly large amounts to achieve the desired excitement.
- Based on survey data, 0.3 per cent of the Irish population (approximately 12,000 people) have been estimated to suffer from problem gambling, with a further 0.9 per cent (35,000 people) at moderate risk and 2.3 per cent (90,000) at low risk. Methodological issues with survey design and response biases mean these figures are likely to be underestimates.

FACTORS ASSOCIATED WITH PROBLEM GAMBLING

- The societal burden of harm from problem gambling is large and may be accounted for mostly by people with less severe problem gambling (simply because they are more numerous). The implication is that broadly targeted interventions and policies may be warranted, rather than those targeted only at those with those with the most severe problem gambling.
- Men, younger people and disadvantaged groups are at greatest risk of problem gambling, as are those with other addictive and mental health issues.
- Compared to other gamblers, people with problem gambling tend to engage more in forms of gambling with a high frequency of rounds, and short time intervals between wagers and potential payouts (e.g. interactive online gambling, casino gambling and electronic gaming machines).

ATTITUDES AND PERCEPTIONS ABOUT PROBLEM GAMBLING

- Gambling is negatively perceived by the public and problem gambling tends to be highly stigmatised.
- Individuals often have difficulty perceiving their own gambling problems and recalling their own gambling expenditures.

THE MARKETING OF GAMBLING

- There is reasonably strong evidence that exposure to gambling advertising increases gambling behaviour.
- Several issues around gambling advertising have been highlighted by recent research, including the targeting of advertising at specific demographics, its unavoidability, the offering of financial incentives to gamble, the lack of effectiveness of 'responsible gambling' messaging, and the increasingly interactive nature of gambling advertising.
- Systematic biases in probability judgements among bettors may be an important reason as to why gambling operators can, and typically do, extract large profit margins on complex bets (i.e. highly specific bets, such as a bet on the combination of first goalscorer and final scoreline in a soccer match).

INTERVENTIONS TO TACKLE PROBLEM GAMBLING

- Supply-side interventions, such as limit-setting tools (i.e. a tool on a gambling website that allows the gambler to pre-set limits on time or money spent gambling) and personalised feedback (e.g. regular updates provided by a gambling website to the gambler on their cumulative losses), have been shown to be effective in preventing and reducing gambling behaviour and problem gambling.
- The evidence in favour of educational interventions for combatting problem gambling is mixed.
- Therapeutic interventions, such as CBT, have been shown to be effective in treating problem gambling.
- There is insufficient evidence at present to conclude that pharmacological interventions are effective in treating problem gambling.

ISSUES FOR CHILDREN AND ADOLESCENTS

- Social casino games (i.e. online games that mimic gambling without real money) are associated with problem gambling, prompting speculation that they may act as a gateway to real gambling and problem gambling, particularly

for children and adolescents. Social casino games are not subject to gambling regulation and so are legally accessible by minors.

- ‘Loot box’ purchasing in video games is very similar to gambling, but remains largely unregulated and so is accessible to minors. Research shows significant correlations between loot box purchasing and problem gambling.

RESEARCH GAPS

The review highlights the following research gaps for informing policy in Ireland:

- Prevalence estimates of problem gambling and its associated factors could be improved by using innovative, experimental techniques to overcome social desirability bias.
- Survey evidence on public attitudes towards gambling is currently sparse.
- Policy would benefit from behavioural audits of marketing techniques used in Ireland. Experiments on the effects of different marketing techniques would provide helpful evidence, but it could be strengthened by access to industry data.
- Although there is international evidence on the effectiveness of various supply-side interventions, behavioural pre-testing of specific interventions in the Irish context could help to identify which regulatory interventions are likely to be most effective prior to implementation.
- In an Irish context, more research is required on social casino games, loot boxes and several other issues relevant in particular for young people.

CHAPTER 1

Introduction

Gambling is a large and growing industry. Annual gross gambling revenue (GGR: total customer stakes minus total customer winnings) in Europe (EU27 and the UK) was €108 billion in 2022, an increase of 23 per cent year-on-year, and an increase of 8 per cent on pre-pandemic (2019) revenues (European Gaming and Betting Association, 2022). Online gambling is rapidly growing in importance – it represented one-quarter of European GGR in 2019, but by 2022 this proportion had risen to over a half (European Gaming and Betting Association, 2022).

In Ireland, 8,000 people were estimated to be directly employed in the gambling industry in 2017 (Inter-Departmental Working Group on Future Licensing and Regulation of Gambling, 2019). Gross gambling revenue in Ireland was approximately €2 billion in 2022, with online gambling representing just under one half of those revenues (European Gaming and Betting Association, 2022). To put the size of the gambling industry in Ireland in context, revenues from gambling in 2022 were approximately the same as those from Irish beef exports (€2.3 billion) (Teagasc, 2022).

As the gambling industry has grown, so has concern about problem gambling. Some high-profile ex-sportspeople, such as ex-England soccer players Tony Adams and Paul Merson, and ex-intercounty Gaelic footballers Oisín McConville and Niall McNamee, have sought to bring problem gambling to the forefront of public consciousness by speaking out about their problem gambling. In 2017, *The Lancet* published an editorial highlighting the issue of problem gambling and calling for action to reduce gambling-related harms (*The Lancet*, 2017). More recently, President of Ireland Michael D. Higgins echoed these sentiments and called for greater regulation of sports gambling advertising (*The Irish Times*, 2021).

In late 2022, the Gambling Regulatory Authority of Ireland (GRAI) was established, and new legislation provided for more stringent regulation of the gambling industry (Houses of the Oireachtas, 2022). In light of this, this review paper summarises and evaluates evidence from international research to answer some of the questions that are relevant to problem gambling policy. Additional aims are to identify where evidence is deficient or lacking and to highlight some important and fruitful avenues for future policy-relevant research, both in terms of topics to explore and methods to employ.

Chapter 2 summarises and evaluates estimates of the population prevalence of problem gambling. Chapter 3 describes sociodemographic, behavioural and psychological factors, as well as the forms of gambling and the harms that are associated with problem gambling. Chapter 4 discusses attitudes and perceptions of problem gambling, Chapter 5 describes research on the marketing of gambling, Chapter 6 explores evidence for interventions to tackle problem gambling, and Chapter 7 discusses some important issues around gambling and young people.

In reviewing the literature, we identified a number of studies which made at least one of the following disclosures: (a) the study was commissioned or funded by the gambling industry or by a charity which receives voluntary funding from the industry; (b) one or more of the study's authors has received funding from or has been employed by the gambling industry. We excluded such studies from the review unless they were published in a peer-reviewed academic journal. We did not exclude studies published in academic journals that made one or more of these disclosures, but the in-text citations and reference listings for such studies are marked with an asterisk, and the relevant disclosures from these studies are included in Appendix A.

CHAPTER 2

The prevalence of problem gambling

2.1 HOW IS PROBLEM GAMBLING DEFINED AND MEASURED?

The most severe form of problem gambling is a gambling disorder. Gambling disorder is classed by the Diagnostic and Statistical Manual of Mental Disorders: DSM-5-TR (American Psychiatric Association, 2022) as a non-substance related addictive disorder. It is defined as ‘persistent and recurrent problematic gambling behaviour leading to clinically significant impairment or distress, as indicated by the individual exhibiting four (or more)’ symptoms from a 9-item checklist in the previous 12 months (American Psychiatric Association, 2022).¹ The symptoms checklist is shown in Appendix B, and includes symptoms such as ‘needs to gamble with increasing amounts of money in order to achieve the desired excitement’, ‘has made repeated unsuccessful efforts to control, cut back, or stop gambling’ and ‘lies to family members, therapist, or others to conceal the extent of involvement with gambling’.

The term problem gambling (PG) is generally used in a broader sense and captures individuals who do not meet the clinical definition of gambling disorder but who may be in a preliminary stage of the disorder (e.g. display some of the symptoms but less than four) (Kourgiantakis et al., 2013; Subramaniam et al., 2015). The most widely used measures to identify individuals with problem gambling in general population research have been the South Oaks Gambling Screen (SOGS) (Lesieur and Blume, 1987), the DSM-IV measure (American Psychiatric Association, 1994), and the Problem Gambling Severity Index (PGSI) (Calado and Griffiths, 2016; Caler et al., 2016; Ferris and Wynne, 2001). Details of the items in each of these measures as well as how they are scored can be seen in Appendix C.

Of these three measures, in recent times the PGSI has become the most popular (Abbott and Volberg, 2006; Caler et al., 2016). It uses a combination of items from both the SOGS and DSM-IV measures (Caler et al., 2016). While the PGSI is accepted as an appropriate population-level measure of more severe PG, some argue that the PGSI may be less appropriate for identifying individuals with less severe PG but who are nonetheless ‘at-risk’ (Roberts et al., 2022*²).

¹ Gambling disorder was called ‘pathological gambling’ in previous editions of the DSM.

² As noted in the Introduction, citations marked with an asterisk relate to studies which made at least one of the following disclosures; (a) the study was commissioned or funded by the gambling industry or by a charity which receives voluntary funding from the industry; (b) one or more of the study’s authors has received funding from or has been employed by the gambling industry.

Revised versions of the SOGS and DSM-IV measures have been developed for adolescents and children: SOGS-RA (Winters et al., 1993), DSM-IV-J (Fisher, 1992) and DSM-IV-MR-J (Fisher, 2000). These revised versions have been used in several studies with younger age groups, as has the PGSI (Calado et al., 2017; Gambling Commission, 2022).

The Irish National Drug and Alcohol Survey carried out by the Health Research Board (HRB) used the PGSI as its primary measure of PG in the 2019-2020 wave of the survey (Mongan et al., 2022). It also measured PG using the DSM-IV measure, for comparability with the 2014-2015 survey when only the DSM-IV measure was used.

2.2 HOW PREVALENT IS PROBLEM GAMBLING?

In Ireland, the latest estimates of PG prevalence are 0.3 per cent (12,000 people) for the overall population (age: 15+), 0.2 per cent in the 15-24 age group and 0.7 per cent in the 25-34 age group (The 2019-2020 Irish National Drug and Alcohol Survey: Mongan et al., 2022). Problem gambling was defined as a score of 8+ on the PGSI (out of a total possible score of 27). An estimated 0.9 per cent (35,000 people) were at moderate risk of PG (PGSI score of 3-7), while an estimated 2.3 per cent (90,000) were at low risk of PG (PGSI score of 1-2). PG rates are lower than they were in the 2014-2015 version of survey, but it is difficult to establish trends in small proportions reliably.

A systematic review of recent studies shows that national-level estimates of past-year prevalence of PG among adults range between 0.12 per cent to 5.8 per cent globally, and between 0.12 per cent and 3.4 per cent in Europe (Calado and Griffiths, 2016). A similar systematic review of young people globally (aged 10-24) found prevalence of 0.2 per cent to 5.6 per cent (Calado et al., 2017). Prevalence in adults aged 60+ varies between 0 per cent and 9.4 per cent (Subramaniam et al., 2015).³

The estimated PG prevalence for the adult population in Ireland of 0.3 per cent puts Ireland at the lower end of global and European rates of PG prevalence (Calado et al., 2017; Calado and Griffiths, 2016). However, cross-national comparisons in this case need to be treated cautiously given large variation in measurement instruments, scoring criteria, and other methods (Calado et al., 2017; Calado and Griffiths, 2016). Indeed, the development of a standardised

³ The highest prevalence rate in adult studies of 5.8 per cent was found in Hong Kong using the DSM-IV measure (Wong and So, 2003). The highest rate in adolescent studies of 5.6 per cent was found in Spain using the SOGS-RA (Iglesias et al., 2001). The highest rate in studies of adults aged 60+ (9.4 per cent) was found among women aged 60-69 in Canada using the Canadian Problem Gambling Index (Afifi et al., 2010).

approach to measuring the adult population prevalence of PG at country-level is warranted in order to facilitate cross-country comparisons.

The European School Survey Project on Alcohol and Other Drugs (ESPAD) allows for cross-country comparisons of adolescent gambling and PG rates, because measurement is carried out in a standardised manner across 35 European countries. Data from 2019 show that 24 per cent of 15/16 year olds in Ireland had gambled for money in the previous 12 months which is slightly above the European average of 22 per cent (ESPAD Group, 2020; McAvoy and Reynolds, 2022). Six per cent of the Irish sample who had gambled in the previous 12 months reported experiences associated with PG, compared to the European average of 5 per cent (ESPAD Group, 2020; McAvoy and Reynolds, 2022).

2.3 ARE PROBLEM GAMBLING PREVALENCE ESTIMATES ACCURATE?

Individuals may understate the extent of their PG when it is measured in surveys. There is a high degree of stigma associated with PG, with individuals who have PG being perceived negatively by themselves and by others, and being portrayed in a negative light in the media (Wöhr and Wuketich, 2021).

‘Social desirability bias’ is the tendency for survey respondents to underreport opinions and behaviours they perceive to be stigmatised (Krumpal, 2013). It can be subdivided into impression management whereby an individual knowingly depicts themselves to others in an overly positive manner, and self-deception, whereby an individual depicts themselves overly positively, but believes this depiction to be accurate (Paulhus, 2002). A number of studies find negative correlations between social desirability bias and PG measures, but not gambling behaviour generally (e.g. gambling frequency, expenditure) (Goldstein et al., 2017; Kuentzel et al., 2008; Schell et al., 2021). While this evidence is correlational, it suggests that social desirability bias may lead to an underestimation of PG in surveys, but perhaps not gambling behaviour among the wider population.

Underestimated PG rates may cause PG to be underappreciated as a societal problem, and thus may lead to policy measures to tackle PG not being given the support they warrant. Underestimated PG may also lead to biased, or inaccurate, estimates of the relationship between PG and related variables (e.g. demographics, behavioural patterns, psychological characteristics), or of the causal effect of an intervention on PG (Millimet and Parmeter, 2022), which can be problematic when estimates of these relationships or causal effects are used to inform policy.

To conclude, social desirability bias may mean PG is underestimated. This underestimation may question the appropriateness of using such estimates to inform policy.

2.4 HOW CAN UNDERESTIMATION OF PROBLEM GAMBLING PREVALENCE BE ADDRESSED?

Most straightforwardly, social desirability bias can be reduced by allowing respondents to self-administer surveys and by assuring them of their anonymity (Krumpal, 2013). Assisted interviewing, such as the computer-assisted personal interviewing (CAPI) used to administer the National Drug and Alcohol Survey, requires respondents to answer questions in the presence of staff working for the surveying organisation. This may exacerbate social desirability bias and lead to population underestimates of PG. Hence a comparison of CAPI estimates of PG with estimates derived from online survey modes may shed light on whether social desirability bias has influenced prevalence estimates in Ireland.

Sophisticated indirect questioning techniques can reduce measurement error arising from social desirability bias in responses to sensitive questions (e.g. questions about drug use, sexual behaviour and exam cheating) (Blair et al., 2020; Tourangeau and Yan, 2007). These techniques allow the prevalence of a sensitive behaviour or attitude to be measured at the aggregate level while concealing the behaviour or attitude of individual participants. Three of the most popular methods are list experiments, randomised response techniques, and crosswise models (Blair et al., 2020; Lensvelt-Mulders et al., 2005; Sagoe et al., 2021; Schnell and Thomas, 2021). A detailed explanation of these three methods can be seen in Appendix D.

One drawback of these indirect question techniques is that they increase noise, or classical measurement error, in estimates (Blair et al., 2020). Increased noise reduces statistical power, meaning that larger sample sizes are needed to make statistical inferences. This is partly by design – these techniques deliberately add noise to the signal from participant responses to protect individual privacy. Additionally, some indirect questions are more difficult for the respondent to understand than direct questions (Jerke et al., 2022), which adds noise if respondents answer the questions incorrectly. Considering whether direct or indirect question techniques are more appropriate therefore requires a trade-off between bias and noise.

We could locate just one study that employed an indirect questioning technique in the context of gambling. Bahadivand et al. (2020) use a list experiment to estimate that 7.5 per cent of a sample of women living in central Iran had engaged in any gambling in the previous year (see further details on this study in Appendix D).

However, they did not ask direct questions in a control sample for comparison, which limits inference on the extent to which social desirability deflates standard survey estimates.

To summarise, alternative survey modes and indirect question techniques have been used to tackle social desirability bias in the elicitation of sensitive information in a range of domains. Indirect question techniques have been scarcely used in a gambling context. Research measuring PG could test indirect question techniques to counteract social desirability bias, albeit with some increased statistical noise.

CHAPTER 3

Factors associated with problem gambling

3.1 THE HARMS ASSOCIATED WITH PROBLEM GAMBLING

The harms associated with PG are plentiful and severe enough to warrant attention. PG affects personal finances, relationships, mental and physical health, education, employment, as well as stigma and risk of criminality (Abbott, 2020; Inter-Departmental Working Group on Future Licensing and Regulation of Gambling, 2019; Langham et al., 2016; Montiel et al., 2022; Public Health England, 2023; Wardle et al., 2019). Families of individuals with PG are also affected (Dowling et al., 2016; Fulton, 2015; 2017; Kourgiantakis et al., 2013). Spouses suffer adverse impacts on their mental and physical health, financial security, family relationships (including those with their children) and their wider social networks. Children of individuals with PG can suffer adverse mental and physical health impacts, as well being more likely to be maltreated and suffer financial deprivation. PG is also associated with poorer functioning of the overall family unit. In England, PG is estimated to have an annual overall societal cost of between £1.05 billion and £1.77 billion (approximately €1.19 billion to €2.00 billion) (Public Health England, 2023).

The aggregate harms of PG at a population level are mostly caused by less severe forms of PG, because the population prevalence of individuals with milder gambling problems far exceeds the prevalence of those with severe PG (Abbott, 2020; Browne et al., 2017; Roberts et al., 2022*). In Ireland, the estimated number of individuals classified as being at low- or moderate-risk of PG is ten times the number classified as having PG. That less severe PG can cause greater population harms is an example of the ‘prevention paradox’ (Rose, 1985).⁴ Broadly-targeted interventions and policies that capture those with less severe PG, rather than interventions and policies that focus only on those with severe PG, may be needed to substantially reduce the overall burden of harm at a population level (Abbott, 2020; Blank et al., 2021; Browne et al., 2017; Roberts et al., 2022*). The prevention paradox applies to other public health issues such as alcohol and smoking, for which broadly-targeted public health measures are widely implemented. While many argue in favour of implementing such broadly targeted policies for PG, some argue that the supporting evidence may not be strong enough to justify such policies and that efforts to do so may risk regulatory and policy overreach (Delfabbro and King, 2017).

⁴ The prevention paradox is a public health concept that refers to a situation where the burden of harm from a disease is mostly accounted for by those with less severe cases of the disease or populations at low- or moderate-risk of the disease, simply because they are more numerous than those with severe cases or at high-risk.

3.2 WHAT SOCIODEMOGRAPHIC, ENVIRONMENTAL, AND OTHER FACTORS ARE ASSOCIATED WITH PROBLEM GAMBLING?

There are several sociodemographic characteristics that are consistently linked to PG across empirical studies: being male, being young, having low income, having low education, and being unemployed (Abbott, 2020; Calado et al., 2017; Calado and Griffiths, 2016; Emond et al., 2022*; Montiel et al., 2022; Mora-Salgueiro et al., 2021). Most of these associations have also been found in Irish data (Condrón et al., 2022; Mongan et al., 2022). Being from an ethnic minority and being single or divorced are also regularly linked to PG (Calado and Griffiths, 2016; Subramaniam et al., 2015). For adolescents, there are links between PG and having parents who gamble, and having lived in a single parent household. These findings mean that PG is associated with multiple characteristics that are more prevalent among people in more socially and economically disadvantaged groups.

Many individuals with PG also suffer from alcohol use disorder, nicotine dependence and other drug addictions (Abbott, 2020; Calado et al., 2017; Emond et al., 2022*; Mongan et al., 2022). A recent Irish study found a strong association between PG and problematic use of alcohol and illicit drugs (Condrón et al., 2022). PG is also associated with mood and anxiety disorders (Abbott, 2020; Lorains et al., 2011; Mora-Salgueiro et al., 2021). Other psychological factors associated with PG are childhood trauma and abuse, feelings of marginalisation, and having big gambling wins in adolescence or when first starting gambling (Abbott, 2020; Calado et al., 2017).

Environmental factors associated with PG are greater availability and social acceptability of gambling (Abbott, 2020; Delfabbro et al., 2016). For young people, accessibility is also an important factor (Delfabbro et al., 2016), while for older adults, a lack of other exciting activities is important (Subramaniam et al., 2015). According to the self-reports of adolescents with PG, the main reasons that they gamble are escapism and an inability to resist temptation, rather than trying to win money (Calado et al., 2017). Interestingly, a positive association between participation in team sports and engagement in online and regular gambling has been found for adolescent males in Ireland (Duggan and Mohan, 2022). Further research is necessary to establish if this association also holds for problem gambling.

It should be noted that the above-mentioned evidence arises from correlational studies, and as such one needs to be careful making causal interpretations. Omitted variables may drive some correlations. For instance, the association between PG and alcohol use disorder may be explained by biological or environmental factors that heighten the risk of addictive behaviours in general. Additionally, in some instances causality may run in both directions – a correlation

between PG and unemployment may be because the reduced time constraints that arise from unemployment lead a person to gamble excessively to fill the time, and/or it may be that PG means that the individual finds it difficult to hold down a job.

Experimental studies can provide causal evidence, but are not well-suited to answer these questions as it is not possible to randomise these factors to a treatment and a control group. Hence, for many risk factors, quasi-experimental evidence is needed to make causal inferences (Meyer, 1995). These are methods which use advanced statistical techniques to estimate causal effects without randomisation by the researcher. For example, where a change in gambling laws alters the availability of gambling in one region but not in another similar neighbouring region, a comparison between the two using quasi-experimental methods can support causal inferences about the effect of gambling availability on PG. A major drawback of quasi-experimental methods is that the data or conditions necessary to implement such methods are often not available.

In the absence of causal evidence, correlational evidence is useful in other respects. It highlights that PG is more prevalent among the more vulnerable members of society (e.g. low SES, multiple addictive disorders). It also provides a guide as to what demographics to target in interventions to tackle PG.

To summarise, PG is associated with being male, being young, and being in disadvantaged groups. Individuals with PG tend to suffer disproportionately from other addictive and mental health issues. Availability and social acceptability of gambling also tend to be associated with PG. Most of this evidence is correlational, however, and future research needs to establish whether there are causal links between PG and these factors. Quasi-experimental methods may be useful in this regard, although the data or conditions to implement such methods are not always available.

3.3 WHAT FORMS OF GAMBLING ARE ASSOCIATED WITH PROBLEM GAMBLING?

Reviews of the existing evidence show that interactive online gambling (e.g. online poker and casino games), casino gambling, and electronic gaming machines (i.e. slot machines) are the forms of gambling that are most strongly associated with PG (Abbott, 2020; Binde, 2011; Calado et al., 2017; Calado and Griffiths, 2016). These games are described as high frequency, fast pay-out gambling as they are characterised by a high frequency of rounds of gambling and a brief time interval between placing a gamble and the pay-out of winnings (Abbott, 2020; Barton et al., 2017; Breen and Zimmerman, 2002; Calado et al., 2017; Calado and Griffiths,

2016). Sports betting and bingo are the next most strongly linked gambling activities to PG, while lotteries are much more weakly correlated with PG (Abbott, 2020; Binde, 2011). For adolescents, slot machines, card games and sports betting are most popular among those with PG (Delfabbro et al., 2016).

Individuals with PG thus engage in disproportionately more high frequency, fast pay-out gambling, and, to a lesser extent, sports betting and bingo. However, these findings are correlational not causal. Individuals with PG may just play more of these games than other gamblers. High frequency, fast pay-out gambling may be more attractive to individuals with PG. There may be inconveniences or social barriers that deter casual gamblers from engaging in high frequency, fast pay-out gambling, that individuals with PG are more willing to overcome (Abbott, 2020). For example, a casual gambler may be reluctant to register and add a credit card to play online gambling games, or to attend a casino if it is not something commonly practiced by their social group.

Additionally, some features of electronic gaming machines may be particularly attractive to those with PG. For example, 'losses disguised as wins' are where the gambler wins a small amount of money that is less than they wagered, resulting in a net loss, but the machine celebrates the 'win' with the same visual and sound effects as it does when the gambler has a net win (Barton et al., 2017). 'Near misses' are where the gambler feels as if they have just missed out on winning, and electronic gaming machines are often programmed to show a disproportionate number of 'near misses' (Barton et al., 2017). 'Losses disguised as wins' have been shown to lead to overestimation of actual winnings by gamblers and to generate excitement consistently, while 'near misses' have been shown to motivate continued play (Barton et al., 2017).

If having PG leads one to engage in more high frequency, fast pay-out gambling, then it is important to establish to what extent the availability of such gambling leads to excess harms to individuals with PG. Specifically, what are the additional harms they suffer over and above the harms that they would suffer in the counterfactual situation where such forms of gambling were unavailable, and they instead engaged in other forms of gambling? There is, to the best of our knowledge, little to no empirical evidence on this at present. Evidence on the additional financial harms suffered could perhaps be provided using data on gambling operator profit margins, and the gambling behaviour of individuals with PG, for each form of gambling. These data would allow for an estimation of the additional financial losses individuals with PG may suffer from playing high frequency, fast pay-out gambling as opposed to alternative forms.

Of course, causality may also go in the opposite direction. Engaging in high frequency, fast pay-out gambling may lead to a person developing PG. If this is the case, then policymakers would need to give serious consideration to measures that could prevent such forms of gambling from having this negative effect on vulnerable individuals. It may also be the case that there is no causal link between PG and these forms of gambling, but that the association between them is driven by some other factor that is causally linked to both. To date, there is a dearth of evidence on the causal relationship between high frequency, fast pay-out gambling and PG that could inform policy.

Individuals with PG thus tend to engage in more high frequency, fast pay-out gambling (interactive online gambling, casino gambling and electronic gaming machines) than other gamblers. Data examining this in Ireland are not available. A carefully designed survey in an Irish sample that can estimate this relationship may thus be of value. Interactive online surveys that use techniques from behavioural science to aid recall (e.g. by putting the onus for aggregation on the researcher rather than the respondent) and limit socially desirable responding (e.g. by using neutral, fact-based questions), as have been used in some recent Irish studies (Lunn et al., 2023; Papadopoulos et al., 2023), would be particularly suitable for this purpose. This could be done in a general or a socio-demographically targeted sample. Additionally, there is little to no evidence on what causes what – does having PG lead to engaging more in such gambling, does such gambling lead to developing PG, or is the correlation between the two driven by another factor that has a causal relationship with both? The answer to this question would provide helpful information for policy formulation around the regulation of such forms of gambling. Quasi-experimental methods may provide evidence on the causal links in this relationship, provided that the right data and conditions were available.

CHAPTER 4

Attitudes and perceptions about problem gambling

4.1 WHAT ARE PUBLIC ATTITUDES TO GAMBLING AND PROBLEM GAMBLING?

Problem gambling is negatively perceived and carries a high level of stigma (Wöhr and Wuketich, 2021). It is perceived as being relatively concealable (i.e. it is not as obvious to others that a person has PG as it may be that a person has, for example, alcohol use disorder) (Fulton, 2019) and having substantial negative effects on a person's life. A belief that the individual with PG is responsible for their problems due to character flaws such as greed and weakness is predominant, both among individuals with PG and among the general public, with few perceiving PG as an addiction. This stigma has negative consequences for the treatment of PG as it deters treatment- and help-seeking (Peter et al., 2019). Given these negative consequences, experiments testing interventions to reduce stigma in an Irish context may be useful.

People also have negative attitudes towards gambling more generally, particularly in relation to the perceived harms that gambling causes, gambling products being too widely available, and those products not being sufficiently regulated (Delfabbro and King, 2021). Despite this, past-year participation rates in gambling are generally quite high, often exceeding 70 per cent. Some speculate that this may be because the questions used to elicit gambling attitudes may prime an individual to give a more negative response, something which may relate to social desirability bias (Delfabbro and King, 2021). In addition, people may not consider lotteries as gambling when asked about their attitudes, yet lotteries are usually included in past-year participation estimates. Research in Ireland that takes these methodological issues into consideration would be helpful to give an insight into public receptiveness towards potential regulation.

4.2 CAN PEOPLE ACCURATELY PERCEIVE WHEN THEY HAVE A GAMBLING PROBLEM?

There is limited evidence on whether individuals can correctly perceive their problem gambling. A US survey of high school students found that only 14 per cent of those who were identified as having PG by the SOGS-R for adolescents perceived themselves as having a gambling problem in a single-item question 'Do you now or have you in the past ever had a gambling problem?' (Cronce et al., 2007). Students were more likely to perceive that they had a problem if they bet larger amounts, bet more frequently, or had a family member with PG.

There is more research on self-perceptions of gambling expenditures. A narrative review finds that estimates of gambling expenditures from survey self-reports in the US tend to not correspond well with data on aggregate gambling revenues obtained from state regulatory agencies (Volberg et al., 2001*). Self-reported gambling expenditure on lotteries, bingo, casino games and pool betting tended to exceed actual revenues, while self-reported expenditure on electronic gaming machines tended to underestimate actual revenues. These comparisons rely on strong assumptions about the representativeness of the samples surveyed and the geographic location of their spending. They also preceded the widespread availability of online gambling. The authors cite the difficulty in recruiting individuals who gamble heavily to surveys, the construction of survey questions, and the irregular nature of some gambling activities that are associated with heavy gambling as key issues in getting accurate self-report estimates.

A survey study with college students found that on average, respondents said they gambled less frequently and with less money compared to a typical college student (Larimer and Neighbors, 2003). While this difference could be due to an underestimation of their own behaviour, it could also be due to an overestimation of the behaviour of others. If they underestimated their own gambling, it may be due to impression management (the intentional form of social desirability bias) or a genuine error in self-perception. If college students tend to overestimate other college students' gambling, it would be interesting to test an intervention to correct this, such as providing descriptive social norm information on gambling behaviour, to see if it changes people's gambling attitudes and behaviour (Bicchieri and Dimant, 2022). Such an intervention has not been tested in the gambling domain to date.

A study with adult gamblers living in Ontario, Canada, tested 12 different questions to elicit past-month gambling expenditures, and found that none of the questions elicited estimates that corresponded well with estimates from daily diaries or estimates calculated from aggregate Ontario gambling revenues (Wood and Williams, 2007). Discrepancies were in both directions rather than responses being systematically too high or too low.

To sum up, there is suggestive evidence that individuals have difficulty perceiving their own gambling problems and recalling their own gambling expenditures. However, the evidence is limited and far from conclusive. Further research is needed to disentangle true misperceptions from intentional impression management to assess whether people tend to systematically underestimate their own gambling behaviour. Experimental survey methods would be suitable. If there are genuine misperceptions rather than purely socially desirable responses, further experiments could test ways to correct them. Insights from such experiments could aid the collection of more reliable data on gambling behaviour in Ireland to inform policy.

CHAPTER 5

The marketing of gambling

5.1 WHAT ARE THE EFFECTS OF EXPOSURE TO GAMBLING ADVERTISING?

A recent meta-analysis of two decades of studies finds evidence that exposure to gambling advertising is associated with increased gambling behaviour and problem gambling (Bouguettaya et al., 2020). While many of the included studies were correlational, a small number employed quasi-experimental methods in an attempt to make causal inferences about the relation between advertising and gambling behaviour. These quasi-experimental studies all found a positive relationship, and suggest that advertising has a causal effect on gambling behaviour, and that there may be a 'dose-response' relationship (i.e. that higher levels of advertising leads to higher levels of gambling). While these studies give insight into the causal effect of advertising on gambling behaviour, there is a lack of evidence on the causal effect of advertising on problem gambling specifically. The meta-analysis also found evidence that exposure to gambling advertising is associated with increased intention to gamble, although the studies are almost all cross-sectional correlational studies, with one longitudinal study. A narrative review of studies from 2014-2018 by Newall et al. (2019*) also found that exposure to advertising is associated with increased frequency of gambling and increased uptake of riskier gambles.

5.2 WHAT ARE THE CURRENT TRENDS AND ISSUES AROUND GAMBLING ADVERTISING?

There are multiple prominent issues with gambling advertising. Here, we identify five. Firstly gambling advertising tends to be very targeted at specific demographics (e.g. young male soccer fans), and is often unavoidable for those targeted (e.g. advertising around televised soccer matches, advertising hoardings at sports grounds) (Newall et al., 2019*; Torrance et al., 2021*). Second, financial incentives are a feature of gambling advertising (e.g. 'Bet €10, Get €20 in Free Bets'), and these incentives tend to have restrictive terms and conditions that people may ignore or not fully understand (e.g. minimum odds, bet type and payment method exclusions) (Newall et al., 2019*; Torrance et al., 2021*). Third, social media advertising has evolved rapidly in recent years, both in terms of its pervasiveness and the new interactive forms of advertising that have emerged on social media, such as direct links to gambling apps in advertisements, polls, and the facilitation of odds requests (Torrance et al., 2021*). Fourth, the effectiveness of 'responsible gambling' messaging in adverts is a cause for concern (Torrance et al., 2021*).

Finally, the heavy advertising of ‘complex bets’ for sporting events may also be an important issue (Newall et al., 2019*; Torrance et al., 2021*). Different bets have different numbers of mutually exclusive outcomes. For example, in a match-winner bet on a soccer match, there are only three possible outcomes (Team A wins, Team A loses, draw). In contrast, there are 25 possible outcomes for a bet on a particular scoreline in a soccer match (if we assume that no team scores more than four goals), and at least 23 possible outcomes for a bet on the first goalscorer. Bets where there are a large number of mutually exclusive outcomes have been termed complex bets (Newall, 2015; 2017). It is in complex bets – where each outcome has a relatively low probability of occurring – that bettors face the greatest risk of harm, due to cognitive biases in processing the likelihood of small probability events. These biases may be an important reason why gambling operators can, and typically do, offer complex bets at odds that are highly unfavourable to the bettor (Ayton, 1997; Kuypers, 2000; Newall; 2015, 2017). See the next section for a detailed discussion on complex bets.

New Irish gambling legislation (Houses of the Oireachtas, 2022) was recommended by the Inter-Departmental Working Group on Future Licensing and Regulation of Gambling (2019) and implemented recently. Some of the changes include restrictions on gambling advertising between 05:30 and 21:00 on TV and online, the requirement of opt-in consent to receive online gambling advertising, and the prohibition of sponsorship of sports teams where children are members. These measures are intended to address the targeting and unavoidability of gambling advertising (the first issue described above) as well as its pervasiveness on social media (issue three). The legislation also prohibits inducements to gamble such as free bets and other financial incentives (issue two) and sets out the specific ‘responsible gambling’ messaging that must be included in gambling advertisements (issue four).

Other European countries have also recently tightened regulation around gambling. These include Belgium, Italy, the Netherlands and Spain (Inter-Departmental Working Group on Future Licensing and Regulation of Gambling, 2019; McLoughlin and Heery, 2022). Italy has introduced a blanket ban on all gambling advertising and sponsorships, and Belgium plans to follow. Belgium recently introduced a ban on celebrity and sportsperson endorsements of gambling products, while the Netherlands has introduced a similar ban on sportspeople. The UK has also recently introduced such a ban, but additionally specified social media influencers among those who are banned from endorsing gambling products. Indeed, the European Commission has highlighted the importance of regulating the advertising of gambling products by social media influencers (European Commission, 2019).

Thus, several issues around gambling advertising have been highlighted by recent research, including the targeting of advertising at specific demographics, its unavoidability, the offering of financial incentives to gamble, the increasingly interactive nature of gambling advertising, the inadequate display of 'responsible gambling' messaging, and the advertising of complex bets. In line with several other European countries, Ireland has introduced tighter regulation recently to address some of these concerns. Internationally, it seems likely that more regulation will follow as regulators seek to address some of the more nuanced issues as well as new issues that arise as the gambling industry evolves. Experiments might be useful as a guide to the formulation of regulation by pinpointing precisely what aspects of gambling advertising are particularly problematic (e.g. What forms, if any, of 'responsible gambling' messaging are effective? How does the presentation of complex bets in advertising affect the extent to which these bets tap into bettor biases?).

5.3 WHY MAY THE ADVERTISEMENT OF COMPLEX BETS BE A CONCERN?

It is a well-established empirical regularity that people's probability judgments (i.e. how they evaluate the likelihood of different events occurring) are subject to a range of systematic biases or errors (Kahneman, 2011). For example, people tend to put too much stock in events with a very small chance of occurring (Kahneman and Tversky, 1979) and tend to overly avoid uncertainty (Ellsberg, 1961). Given the crucial role that probability judgments play in gambling, this suggests that gambling operators may be able to exploit such biases in order to earn large profit margins. This may particularly be the case for complex bets, which we defined in the previous section as bets where there are a large number of mutually exclusive and low probability outcomes (e.g. scoreline bet in a soccer match).

Support theory offers an explanation as to why gambling companies may be able to earn higher profit margins on complex bets (Tversky and Koehler, 1994). According to support theory, an individual's perception of the likelihood of an event occurring can depend on the richness of the description of that event. As an example of how a richer description can increase perceived probability, a US study showed that participants were willing to pay more for health insurance that provided cover for hospitalisation for 'any disease or accident' than for health insurance that provided cover for 'any reason' (Johnson et al., 1993). Support theory also implies subadditivity, which means that when a single event is divided up into a number of sub-events, the sum of the perceived probabilities for each of the sub-events may exceed the perceived probability for the single event, as the subdivision results in richer descriptions. One of the studies carried out by Tversky and Koehler (1994) to illustrate this elicited participants' perceived probability that the death of an individual in the US occurs due to natural causes and also elicited their perceived probabilities that a death occurs due to each of heart disease,

cancer, and other natural causes. The average perceived probability for the former event was 58 per cent, while the sum of the probabilities for the latter sub-events came to 73 per cent.

Support theory has implications for complex bets in that the probability of bets with richer descriptions may be overestimated relative to the probability of those with less rich descriptions, and complex bets generally have richer descriptions. For instance, the bet 'match to finish on a scoreline of 1-1' is more complex and has a richer description than the event the 'match to end in a draw', and thus the probability of the former may be overestimated relative to that of the latter. This can make complex bets, which have unfavourable odds and lower probabilities, more attractive to the bettor and earn the gambling operators higher profit margins as a result. A further illustration of this is related to the subadditivity implied by support theory – if a bettor were to attribute a perceived probability to each possible draw scoreline in a soccer match (e.g. 0-0, 1-1, 2-2, ...), according to support theory the sum of these probabilities would exceed the perceived probability they would attribute to the less complex bet of a draw. This can make complex bets, which have unfavourable odds and lower probabilities, more attractive to the bettor and earn the gambling operators higher profit margins as a result.

The overweighting of small probabilities may also help gambling operators to charge higher profit margins on complex bets. This is where individuals put too much stock in low probability events and can help to explain why people buy lottery tickets even though the expected value of the lottery ticket (potential winnings x probability of winning) is much lower than the ticket price (Kahneman and Tversky, 1979). It also can help to explain why people take out mobile phone insurance even though the expected loss from damage, loss or theft is much less than the insurance premium paid. As complex bets tend to be on low probability outcomes, overweighting of small probabilities can lead to the perceived probability of success for a complex bet to be overestimated relative to that of a simpler bet, meaning that a bettor will be willing to accept more unfavourable or shorter odds for complex bets.

A common type of complex bet is a conjunction bet, which is a bet on a joint outcome (i.e. two or more single outcomes occurring together). An example of a conjunction bet is a scorecast bet, which only pays out if the bettor correctly predicts both the first goalscorer and the correct scoreline in a soccer match (e.g. Argentina win 2-0 and Messi scores the first goal). Conjunction bets can be highly complex, particularly if they combine single outcomes that, if bet on alone, would themselves be complex bets. A scorecast bet has at least 575 possible joint outcomes.

Conjunction bets arguably provide more scope for exploitation of bettor biases than other complex bets. This is because of the potential for high levels of complexity, and also because conjunction bets expose bettors to additional errors and biases in judgement on top of those that we have just discussed. Conjunction bias is a common bias where an individual prefers conjunction bets to single bets, or more specifically they overestimate the probability of a conjunction bet relative to that of a single bet (Bar-Hillel, 1973; Slovic, 1969). Conjunction fallacy is an extreme form of conjunction bias where an individual perceives the probability of a joint bet as being higher than the probability of any one of the single bets that make up the joint event (i.e. $P(A,B) > P(A)$), which is not possible according to probability theory (Tversky and Kahneman, 1983). For instance, it is not possible for the joint outcome 'Messi scores first' and 'Argentina win 2-0' to be more probable than the single event 'Messi scores first' or the single event 'Argentina win 2-0', as the joint outcome is a subset of each of the single events. However, a person falling prey to conjunction fallacy may perceive the probability of the joint outcome to exceed that of one or both of the single outcomes.

Tversky and Kahneman (1983) attribute conjunction fallacy to the representativeness and availability heuristics. A joint event can be interpreted as more representative than either of the single events from which it is composed, which is to say that it tells a more coherent and plausible story than either of the single events on their own. Relatedly, a joint event can be more available if it is easier to recall instances of the joint event occurring. When joint events are more representative and/or available than the single events, conjunction fallacies can occur (Kahneman, 2011; Tversky and Kahneman, 1983). For instance, participants in an experiment judged that a flood as a result of an earthquake in California was more probable than any flood occurring in North America, though the former is a subset of the latter (Tversky and Kahneman, 1983). In the same way, Messi, Argentina's best player, scoring first and Argentina winning may be judged more probable than Argentina simply winning, due to representativeness and availability. Bookmakers can take advantage of this to gain higher profit margins on conjunction bets which tap into the representativeness and availability heuristics. Of all the biases that are related to complex bets, conjunction fallacy arising from the representativeness and availability heuristics is arguably the one that deserves the most attention from a policy perspective, given that it is the bias that leads to the most obvious mistakes in bettor decision-making.

Bookmakers can also take advantage of the difficulty bettors may have in computing joint probabilities in conjunction bets, even in the absence of any of the biases outlined above. When the events within a conjunction bet are independent (e.g. Argentina to beat France and Croatia to beat Morocco), that is to say that they are not correlated with each other, the probability of the joint event is simply

calculated by multiplying the single probabilities (i.e. $P(\text{Arg,Cro}) = P(\text{Arg}) \times P(\text{Cro})$). However, when the single events are not independent, the probability of the joint event will be more difficult to calculate. For instance, it is likely that the event 'Argentina to win' will be correlated with the event 'Messi to score first', and so the joint probability will be $P(\text{Arg, Messi}) = P(\text{Arg}|\text{Messi}) \times P(\text{Messi})$, where $P(\text{Arg}|\text{Messi})$ is the probability of Argentina winning, conditional on Messi scoring first. Note that as the correlation between Messi scoring first and Argentina winning is likely to be positive, then it is likely that $P(\text{Arg}|\text{Messi}) > P(\text{Arg})$, and so $P(\text{Arg, Messi}) > P(\text{Messi}) \times P(\text{Arg})$. This in turn means that the bookmaker should offer shorter odds on this conjunction bet than if the two single events were independent. By how much shorter the odds should be is very difficult for an ordinary bettor to quantify, given the difficulty in estimating $P(\text{Arg}|\text{Messi})$, and this uncertainty may be taken advantage of by betting companies to increase their profit margins on such conjunction bets.

Empirical evidence shows that complex bets generally carry odds that lead to a greater expected loss margin for the bettor, or a higher expected profit margin for the bookmaker, than the odds for less complex bets (Ayton, 1997; Kuypers, 2000; Newall, 2015, 2017), and that odds tend to be subadditive (Ayton, 1997). For the 2014 soccer World Cup, bettor expected loss margins (or bookmaker expected profit margins) at leading UK bookmakers averaged 5 per cent for match winner bets, 28 per cent for scoreline bets, and 48 per cent for first goalscorer bets (Newall, 2015) – very large differences in value for an apparently competitive consumer market. The higher profit margins that are generally tied to complex bets gives bookmakers an incentive to promote such bets more heavily, and there is empirical evidence that bookmakers do indeed respond to this incentive. 'Special bets' promoted in gambling advertisements and betting shop windows are predominantly highly complex bets, and often conjunction bets on non-independent outcomes that leverage the representativeness and availability heuristics, which carry high expected loss margins for the bettor (e.g. Messi to score first and Argentina to win 2-0) (Newall, 2015; 2017).

Experimental evidence shows that participants fell prey to conjunction fallacies in 36 per cent to 53 per cent of predictions of soccer match winners, with frequent bettors committing such fallacies more often than sporadic bettors (Erceg and Galić, 2014). Additionally, Nilsson and Andersson (2010) find for soccer match winner predictions that a joint event of a low probability outcome (i.e. underdog wins) and a high probability outcome (i.e. favourite wins) was judged more probable by participants than the single event of the low probability outcome, but that this was not the case when the low probability outcome was combined with another low probability outcome.

Systematic biases in probability judgements among bettors may be an important reason as to why betting companies can, and typically do, extract large profit margins on complex bets, and in particular conjunction bets, relative to simple bets. Complex bets are heavily marketed. While some experimental research has been conducted on complex bets and how they relate to biases in judgement by bettors, there is scope to measure the likely impacts of complex bets within the Irish market. Experimental research might also be used to test different regulatory tools that might help to debias bettor judgements and reduce harm to bettors from complex bets, particularly those arising from conjunction fallacies. An example of such a tool might be displaying the odds for the two single bets that make up a conjunction bet alongside the odds for the conjunction bet.

CHAPTER 6

Interventions to tackle problem gambling

6.1 WHAT INTERVENTIONS ARE EFFECTIVE TO REDUCE PROBLEM GAMBLING?

A recent mapping review published in *The Lancet Public Health* identifies and categorises the available review-level evidence on PG (Blank et al., 2021). This paper categorises PG interventions into population-level interventions, which aim to reduce population-wide risk of PG and tend to be more preventive in nature, and individual level-interventions, which aim to treat people with PG individually and tend to be more curative, relatively speaking. Population-level interventions are further subcategorised into demand reduction interventions, which attempt to tackle PG by reducing the demand for gambling among potential gamblers without restricting their opportunity to gamble, and supply-side interventions, which seek to restrict opportunities to gamble by altering the gambling products being offered. Demand reduction interventions, in the form of educational programmes, have mostly been tested with children and adolescents. Such interventions generally increase awareness of PG, but the evidence is mixed for their effects on gambling behaviour and PG (Keen et al., 2017; Kourgiantakis et al., 2016; Ladouceur et al., 2012; McMahon et al., 2019). The evidence for the effectiveness of supply-side interventions is more promising. Supply-side interventions for which there is reasonably strong evidence for their effectiveness in reducing gambling behaviour and PG include limit-setting (i.e. gambler pre-sets expenditure limits), the prohibition of large cash notes, maximum bets, removal of ATMs from betting venues, personalised feedback (e.g. on total losses), and smoking bans in venues (Ginley et al., 2017; Ladouceur et al., 2012; McMahon et al., 2019; Tanner et al., 2017). The evidence to date suggests, however, that restricted opening hours for gambling venues and caps on the number of electronic gaming machines in venues are not effective in reducing gambling behaviour and PG.

An experimental study of supply-side interventions was conducted for the European Commission to help inform gambling regulation policy (Codagnone et al., 2014). This study tested in lab and online experiments the effect of a number of immediately pre-gamble and in-gamble interventions on gambling behaviour in an online casino gambling setting. A previous European Commission report had recommended that several of these interventions should be employed by online gambling operators (European Commission, 2012). The pre-gamble interventions appeared just before a participant gambled and included pictorial warnings, textual warnings, a task about overconfidence in probabilistic judgements, logos of the national provider of information on PG, details of a PG helpline, terms and conditions, and a registration form. None were found to affect gambling behaviour

(monetary amount per gamble and speed of gambling). The in-gamble treatments included limits on expenditure (fixed or self-imposed), and feedback on time spent and winnings/losses. All were effective in reducing monetary amount per gamble and speed of betting.

Individual-level interventions have mostly been focused on treating individuals with PG through therapy, self-help and mutual support, or pharmacological interventions (Blank et al., 2021). In terms of therapeutic interventions, Cognitive Behavioural Therapy (CBT) has been shown to be effective in reducing gambling behaviour and PG (Cowlshaw et al., 2012; Gooding and Tarrier, 2009; Petry et al., 2017; Tolchard, 2017). There is also some support for the effectiveness of motivational interviewing, particularly if paired with CBT (Cowlshaw et al., 2012; Petry et al., 2017; Yakovenko et al., 2015). Personalised Feedback Intervention therapy has also been found to be effective, particularly for mild PG (Grande-Gosende et al., 2020; Marchica and Derevensky, 2016; Peter et al., 2019a; Petry et al., 2017). In terms of delivery, online therapeutic interventions have been found to be effective (Augner et al., 2022; Chebli et al., 2016; Van Der Maas et al., 2019), though face-to-face therapeutic interventions are generally more effective than self-guided ones (Goslar et al., 2017). Brief therapeutic interventions have been shown to be as effective as longer ones, at least in the short term (Quilty et al., 2019).

Turning to self-help, self-exclusion from gambling venues or websites is effective in reducing problem gambling behaviour, although effects tend to dissipate after the exclusion period ends (Drawson et al., 2017). Additionally, as the sample included in self-exclusion studies tends to be selective (i.e. individuals who voluntarily self-exclude themselves), the positive short-term effects of self-exclusion may not apply to individuals who are coaxed into such self-exclusion. In terms of mutual support interventions, the results for Gambler's Anonymous groups are mixed (Schuler et al., 2016). The evidence for pharmacological interventions is also mixed, with there being insufficient evidence at present to conclude that pharmacological interventions are effective in treating PG (Blank et al., 2021; Dowling et al., 2022).

Individual-level interventions, such as therapy and pharmacological interventions, are often delivered via PG treatment services provided by healthcare providers. In Ireland, just over half of all cases or episodes referred to such services are treated on an inpatient basis, with almost 40 per cent treated on an outpatient basis (Condrón et al., 2022). However, there is a need to strengthen links between inpatient and outpatient services (Condrón et al., 2022), and to develop specialist units to provide these services (O'Gara, 2018). Additionally, there is a need in Ireland for dedicated referral pathways to these services (Condrón et al., 2022). Almost half of all referrals are self-referrals, one-fifth are family or friend referrals,

with referrals from GPs and mental health professionals accounting for only 7 per cent and 4 per cent respectively of all referrals.

Despite a substantial amount of research on interventions to tackle PG, there are still some gaps: there is a dearth of research on the effectiveness of screening interventions which can identify individuals at risk of PG at an early stage, and also a lack of research on the effectiveness of long-term supports to prevent relapses in individuals with PG who are in remission (Blank et al., 2021).

In terms of individual-level curative interventions, there are therapeutic interventions, such as CBT, that have been shown to be effective in tackling PG. In terms of population-wide preventive interventions, supply-side interventions, such as limit-setting tools and personalised feedback, are effective in reducing gambling behaviour and PG, and indeed show more promise than educational interventions for which the current evidence is mixed. Supply-side interventions are of particular interest as a regulatory tool, given their promise and their broadly-targeted nature. While individual-level interventions are mostly focused on those classed as having PG (estimated at 12,000 people in Ireland), population-level interventions (which include supply-side interventions) can also benefit those with moderate- and low-risk of PG (approximately 125,000 people in Ireland). Such broad targeting may be important in making substantial inroads in reducing the aggregate burden of harm from PG at a population level, as discussed in Section 3.1. Although there is international evidence on the effectiveness of supply-side interventions, behavioural pre-testing of specific interventions in the Irish context could help to identify which interventions are likely to be most effective prior to implementation via regulation.

6.2 WHAT INTERVENTIONS ARE BEING IMPLEMENTED BY GAMBLING OPERATORS?

Supply-side interventions to reduce PG can be implemented voluntarily by gambling operators, or can be mandated by regulators. Such interventions are often referred to as responsible gambling features (Blaszczynski et al., 2004, 2011*). Catania and Griffiths (2021*) examined 50 of the most popular online gambling websites for the presence of an array of responsible gaming features, including the presence and comprehensiveness of a dedicated responsible gambling page, age checks, various tools such as limit-setting, self-exclusion and cooling-off periods, easily accessible account history, and communication from the customer service helpdesk that promoted responsible gambling. This study found that although the responsible gambling features of online gambling websites have improved over time, there is still room for improvement in terms of more robust age checks, not having promotional material on dedicated responsible gambling

pages, and more promotion of responsible gambling from customer service helpdesks.

In the Irish context, a similar study evaluated the responsible gambling measures of 39 online gambling websites operating with either a '.ie' or '.com/.ie' domain (Cooney et al., 2021*). This study found that, although most websites had a dedicated responsible gambling page and some responsible gambling tools available, responsible gambling features in general were available in an inconsistent manner across websites, and that improvement was particularly needed in terms of feedback and limit-setting tools, as well as age checks.

These studies highlight that, while there has been some voluntary adoption of responsible gambling features by gambling operators, there are still many deficiencies in this regard. The new Irish gambling legislation addresses some of these deficiencies by making it mandatory for gambling operators to offer limit-setting tools and to refuse to provide gambling services to individuals who have self-excluded via the National Gambling Exclusion Register (Houses of the Oireachtas, 2022).

To summarise, some supply-side interventions, or responsible gambling features, have been adopted by gambling operators, but there are deficiencies. The new Irish gambling legislation addresses some of these deficiencies by making some responsible gambling features, such as limit-setting tools, mandatory.

CHAPTER 7

Issues for children and adolescents

7.1 ARE SOCIAL CASINO GAMES A SOURCE OF CONCERN?

Given the strong correlation between high frequency, fast pay-out gambling and PG discussed in Section 3.3, it is apt to consider whether social casino games (SCGs), and particularly their use by children and adolescents, are a source of concern (Derevensky and Gainsbury, 2016*). SCGs are online games, usually played through social media, on a website or on a mobile app, which mimic real gambling, except that players do not wager or win real money, but instead play with virtual chips (Gainsbury et al., 2014). Some of the most popular SCGs mimic the high frequency, fast pay-out forms of gambling highlighted in Section 3.3 such as poker, slot machines, and other casino games (Derevensky and Gainsbury, 2016*; Gainsbury et al., 2014; King et al., 2016). These games usually operate on a freemium basis, meaning that players initially access a basic free game but have to make in-game purchases to access additional content, for example, to play more sophisticated games or to play more frequently (Derevensky and Gainsbury, 2016*; Gainsbury et al., 2014; Kim et al., 2014; King et al., 2016).

As SCG players cannot wager or win real money, gambling regulation generally does not apply to SCGs (Gainsbury et al., 2014; 2016). This means that there are no prohibitions on minors playing. This, in conjunction with there being no requirement to register a credit card or transfer money to play the free version of these games, makes SCGs highly accessible to minors (Derevensky and Gainsbury, 2016*). Some recent evidence on the prevalence of SCG play among adolescents in Canada found that 12.4 per cent of adolescents sampled had played SCGs in the previous three months (Veselka et al., 2018). An Australian study found that 23.4 per cent of adolescents sampled had ever played SCGs, with 40 per cent of those having made in game-purchases (King et al., 2016). It is worth noting here that the samples used in these studies were not designed to be nationally representative but are nonetheless illustrative of the popularity of SCGs among adolescents.

The main source of concern with SCGs is that they may act as a gateway to real gambling activities and to PG, particularly for children and adolescents (Derevensky and Gainsbury, 2016*; Hayer et al., 2018; Kim et al., 2014), and especially given that much SCG play is centred around games that mimic high frequency, fast pay-out gambling. There have been a number of studies that show a correlation between playing SCGs and PG in adolescents and college age youths (Derevensky and Gainsbury, 2016*; King et al., 2016; Veselka et al., 2018), particularly for those who make SCG in-game purchases (King et al., 2016).

A longitudinal study by Kim et al. (2014) with adults showed a high rate of migration from SCG playing to online gambling, with SCG in-game purchases being a strong predictor of migration. Longitudinal studies with high school students in Canada and Germany showed that playing SCGs predicts whether a student will begin real gambling within a year (Dussault et al., 2017; Hayer et al., 2018). Gainsbury et al. (2016) found that 19 per cent of adult SCG players self-reported that they had gambled for money as a result of playing SCGs, and that there was an increased prevalence of PG among this group.

While these studies provide useful correlational evidence, none provide evidence, other than through self-reports, that SCG playing causally increases gambling activities and PG. There are, however, a number of plausible mechanisms through which SCG play may increase gambling and PG. Firstly, winning in SCGs is often determined by an algorithm that seeks to maximise player engagement and enjoyment, which means that players win more frequently than if winning was determined by random chance, and that the sequence of wins and losses is determined in order to maximise excitement and continued play (Gainsbury et al., 2014). This could lead to players developing a false sense of confidence about their chances of winning in real gambling activities, and motivate SCG players to move on to gambling for real money (Derevensky and Gainsbury, 2016*). A recent experimental study (Kim et al., 2019) with SCG players tested whether playing an SCG with odds favourable to the player increased the probability, relative to playing an SCG with neutral or unfavourable odds, that participants would play a subsequent roulette game for real money. However, there was no effect. One could speculate that, as all participants were SCG players, long-term exposure of participants to favourable odds from their previous SCG play may have crowded out any effect that the relatively short treatment (10 minutes of exposure) may have had. It would be interesting to replicate this research with participants who have not previously played SCGs, to see if results differ.

A second mechanism by which SCGs may increase gambling and PG is that time spent playing SCGs may change an individual's perception of gambling, normalising it and making attitudes towards gambling more positive (Kim et al., 2014). Thirdly, making in-game purchases in SCGs may normalise paying money to gamble (Kim et al., 2014; King et al., 2016). Finally, if SCG players derive a sense of excitement from playing, they may move onto real gambling in order to obtain an even greater 'high' (Kim et al., 2014). There are other plausible interpretations of the association between SCG and PG that do not imply that SCGs increase PG. For instance, it may be that a predisposition to gambling problems increases the likelihood that a person plays SCGs and engages in regular gambling. PG would thus emerge even if SCGs were unavailable.

To sum up, social casino games (SCGs) mimic real gambling, except that players cannot wager or win real money. Some of the most popular SCGs mimic high frequency, fast pay-out gambling that is strongly associated with PG, and indeed playing SCGs has itself been found to be associated with PG. This has prompted speculation that SCGs may act as a gateway to real gambling and PG, particularly for children and adolescents, given that SCGs are not subject to gambling regulation and so legally accessible by minors. However, there is a lack of causal evidence at present that would lend strong support to this speculation. There is potential for experimental studies to provide such evidence, as highlighted by the study of Kim et al. (2019) which investigated experimentally the effect of exposure to favourable odds in an SCG on short-term gambling behaviour. As a first step, survey evidence on the current prevalence of SCG play and its correlates among Irish adolescents would be valuable, given that this is currently lacking.

7.2 ARE LOOT BOXES IN VIDEO GAMES A SOURCE OF CONCERN?

Loot boxes are an important feature of many popular modern video games. They are virtual boxes that can be acquired in a video game as a reward for good performance in the game, or can be purchased with real money within the game. The contents of these boxes are randomised and unknown to the gamer prior to being acquired. These contents may confer some benefit to the gamer within the game, such as extra weapons, armour, or 'skins' (e.g. a change of appearance of their avatar in the game), but may also provide little to no benefit (Gambling Commission, 2022; Zendle et al., 2019; Zendle and Cairns, 2018; 2019). Popular games which feature loot boxes are FIFA 2023, Apex Legends, and Call of Duty: Mobile. A quarter of young people aged 11-16 in Britain report having purchased loot boxes in a video game (Gambling Commission, 2022).

The main concern with loot boxes is that they are very similar to gambling, particularly when paid for with real money, but remain largely unregulated and so accessible to minors (Gambling Commission, 2022; Zendle et al., 2019; Zendle and Cairns, 2018; 2019). In buying a loot box, the gamer places a wager to be in with a chance of winning a reward in the game, just like a gambler places a wager to be in with a chance of winning a reward (i.e. a larger sum of money). An exception to the lack of regulation of loot boxes is Belgium, where all loot boxes that are paid for with real money are banned (Zendle and Cairns, 2018).

Research has shown correlations between loot box purchasing and PG, both in adults (Zendle and Cairns, 2018; 2019) and in adolescents (Zendle et al., 2019). Given the correlational nature of these studies, the direction of causality is unclear – loot box purchasing may lead to PG, and/or loot box purchasing may be more attractive to those who already have PG. Loot boxes, similar to SCGs, may lead to gambling and PG by normalising the payment of money for an uncertain reward,

or if gamers move onto real gambling from loot boxes in order to obtain an even greater 'high'. If that is the case, the lack of regulation of this gateway to PG is a serious cause of concern. In the case that loot box purchasing is more attractive to individuals with PG, regulation may also be called for to prevent young people and adults with PG from being exploited. Further research is needed to clarify the direction of causality in this relationship. While longitudinal data would not provide conclusive evidence on causality, they may provide useful insights. Additionally, research is lacking in an Irish context on the extent of loot box purchasing among young people, and on the link between such purchasing and PG. Such evidence may be important to inform policy on this issue.

7.3 WHAT ARE THE OTHER IMPORTANT ISSUES AROUND GAMBLING AND YOUNG PEOPLE?

In a narrative review of studies on PG among adolescents, Delfabbro et al. (2016) highlight a number of other important issues related to young people and gambling. The first is that the large increase in the promotion of gambling via social media in recent times means that the protection of minors from such promotion is growing increasingly difficult, particularly when it is easily shared among private connections on a social media platform. The use of social media influencers and celebrities in promotions seems particularly problematic (European Commission, 2019). Secondly, the boundaries between what constitutes video gaming and gambling, and thus what is regulated and not regulated, are becoming increasingly blurred (Fulton, 2017). This point is perhaps most strikingly illustrated by the loot box issue discussed above. A third issue is the use of design features in some forms of gambling that are appealing to children, such as child-like cartoons in slot machines or popular children's games on scratch cards. Fourth, there is a lack of consistent enforcement of age restrictions on gambling websites and apps. This final issue has been highlighted by the Institute of Public Health in Ireland, who recommend the introduction of test purchasing schemes to combat the problem (Institute of Public Health, 2022). This seems particularly important given findings highlighted previously in Section 6.2 about the inadequacy of age verification checks on many gambling websites (Catania and Griffiths, 2021*; Cooney et al., 2021*).

In an Irish context, there is little research on these issues relating to children and adolescents, in particular the extent to which minors are being exposed to gambling advertisements via social media and the extent to which they can bypass age checks and access gambling websites and apps.

CHAPTER 8

Summary and conclusion

This review focuses on several aspects of problem gambling (PG) that are of particular relevance to policymakers. It summarises and evaluates the evidence from international research relating to each aspect. This is done with the aim of identifying the most important and fruitful avenues for future policy-focused research.

8.1 SUMMARY OF FINDINGS

The review first focuses on the prevalence of PG, noting that past-year PG prevalence estimates in Ireland are low by international standards, at 0.3 per cent. However, the figure of those at risk of PG is ten times higher, and cross-country comparisons are hindered by high variability in approaches to measuring PG prevalence. Additionally, due to the likely effect of social desirability bias on responses to PG surveys, PG prevalence rates may well be underestimated. Alternative survey methods and indirect question techniques, which have been used to address social desirability bias in measuring the prevalence of other sensitive behaviours, would be a useful tool for future research on PG prevalence.

Men, younger people, disadvantaged groups, and individuals with other psychological disorders and addictions are more likely to experience PG. Greater availability of gambling outlets and more social acceptability of gambling are also associated with higher societal PG rates. High frequency, fast pay-out forms of gambling such as interactive online gambling, casino gambling and electronic gaming machines are strongly associated with PG. The evidence on these associations in an Irish context is scant, however, and such evidence would be valuable from a policy perspective.

There is a good deal of stigma associated with PG, and gambling in general is negatively perceived by the public, although this second finding may partly be explained by methodological flaws in how gambling attitudes are often measured. Research on attitudes towards gambling and PG using a rigorous methodology in an Irish context would provide valuable insight into public appetite for various forms of potential future regulation. Experiments could also explore interventions to reduce stigma, given its negative consequences in terms of deterring help-seeking.

There is some suggestive evidence that people underestimate their own PG, but more experimental research is needed to confirm if this is an empirical regularity

and, if so, how such misperceptions can be corrected. Interactive online surveys that use techniques from behavioural science to aid recall and limit socially desirable responding may be useful to help correct such misperceptions in survey data. Indeed, surveys using such techniques may be able to provide up-to-date, detailed, and reliable data on gambling behaviour in Ireland. This would be valuable from a policy perspective in helping to increase understanding not just of individuals with PG, but also of people who do not meet the definition of PG but who nonetheless wish they gambled less.

The evidence is reasonably strong that increased advertising leads to increased gambling behaviour. The literature on gambling advertising highlights a number of issues that may be of particular concern from a PG perspective. These issues include the demographic targeting of advertisements, the offering of financial incentives to bet, complex bets, and the effectiveness of 'responsible gambling' messaging. Complex bets are a particularly interesting issue from a behavioural science standpoint given that well-known biases in probability judgements among bettors may be an important reason as to why betting companies can, and typically do, extract higher profit margins from such bets. The new gambling legislation in Ireland introduces regulations designed to address some of these issues highlighted by the literature. Experiments would be useful to inform the formulation of future regulations that address issues in gambling advertising, particularly for issues like complex bet advertising which are quite nuanced. More specifically, experiments can help to pinpoint precisely what elements of a particular aspect of advertising are problematic and can be used to pre-test potential regulatory interventions to ensure that they are effective.

Regulatory interventions can also be informed by evidence on PG interventions. Educational programmes for students show only mixed results, but many supply-side interventions, such as providing limit-setting tools and personalised feedback during gambling, can be effective in reducing gambling behaviour and PG. Supply-side interventions are inconsistently applied by gambling operators, and regulation may be needed to ensure greater consistency. Behavioural pre-testing can be valuable to ensure that supply-side interventions are optimally designed for the specific context in which they will be implemented.

The above-stated need for Irish-specific research relates not just to adults but also to gambling and PG among adolescents. Online social casino games and video game loot boxes in particular are an important consideration for this cohort, as both are associated with PG and are largely unregulated. Further evidence is vital for informing policies to tackle these issues.

8.2 CONCLUSION

The international evidence on PG points to the need for greater action to address gambling-related harms, supporting recent calls from medical professionals (*The Lancet*, 2017). Across each policy issue covered in this review – PG prevalence estimates, its predictors, public perceptions, marketing tactics, preventive interventions and risks to young people – there is a clear need for further evidence specific to Ireland. Given the evidence reviewed here, a combination of data from multiple sources is likely to be most effective at informing policy, including administrative health databases, survey research, diagnostic experiments, and pre-tests of interventions. Given the relatively small proportion of the population that is most severely affected by the issues raised and the consequent difficulty in capturing this group accurately in a survey, anonymised data provided by industry to help to identify behavioural patterns of those with PG and those at-risk would be especially helpful.

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Note: Studies which contain at least one of the following disclosures are marked with an asterisk at the end of the title of the study: (a) the study was commissioned or funded by the gambling industry or by a charity which receives voluntary funding from the industry; (b) one or more of the study's authors has received funding from or has been employed by the gambling industry.

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APPENDIX A

Disclosures in included studies relating to gambling industry links

Blaszczynski et al. (2011)*

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Catania and Griffiths (2021)*

‘Conflict of Interest – Maris Catania is an employee of Kindred Group Plc that provides online gambling services and a doctoral student of Professor Griffiths at the Nottingham Trent University. Any online gambling company owned by the Kindred Group was omitted from the evaluation in the present study. Mark Griffiths’ university currently receives funding from Norsk Tipping (the gambling operator owned by the Norwegian Government) for research evaluating responsible gambling tools in Norway. The second author has received funding for a number of research projects in the area of gambling education for young people, social responsibility in gambling, and gambling treatment from Gamble Aware (formerly the Responsibility in Gambling Trust), a charitable body which funds its research program based on donations from the gambling industry. Mark Griffiths undertakes consultancy for various gaming companies in the area of social responsibility in gambling.’

Cooney et al. (2021)*

‘Conflict of Interest – MG’s university currently receives funding from Norsk Tipping (the gambling operator owned by the Norwegian Government) for ongoing research. MG has received funding for a number of research projects in the area of gambling education for young people, social responsibility in gambling and gambling treatment from Gamble Aware (formerly the Responsibility in Gambling Trust), a charitable body, which funds its research program based on donations from the gambling industry. MG also undertakes consultancy for various gaming companies in the area of social responsibility in gambling. The remaining authors (CC, DC, JC, and COG) have no conflicts of interest.’

Derevensky and Gainsbury (2016)*

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Emond et al. (2022)*

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European Gaming and Betting Association (2022)

‘The European Gaming and Betting Association (EGBA) is the Brussels-based trade association representing the leading online gaming and betting operators established, licensed and regulated within the EU’ (<https://www.egba.eu/about-us/>).

Newall et al. (2019)*

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Roberts et al., (2022)*

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March 2022 the clinic will only receive funds from the National Health Service. She is also board member of the International Society for the Study of Behavioural Addictions, President of the Royal Society of Medicine Psychiatry Section and Trustee of the RSM Elected Board of Science member at the British Medical Association.'

Torrance et al. (2021)*

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Volberg et al., (2001)*

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APPENDIX B

Gambling disorder symptoms checklist

Gambling disorder symptoms checklist from DSM-5-TR (American Psychiatric Association, 2022):

1. Needs to gamble with increasing amounts of money in order to achieve the desired excitement.
2. Is restless or irritable when attempting to cut down or stop gambling.
3. Has made repeated unsuccessful efforts to control, cut back, or stop gambling.
4. Is often preoccupied with gambling (e.g. having persistent thoughts of reliving past gambling experiences, handicapping or planning the next venture, thinking of ways to get money with which to gamble).
5. Often gambles when feeling distressed (e.g. helpless, guilty, anxious, depressed).
6. After losing money gambling, often returns another day to get even ('chasing' one's losses).
7. Lies to conceal the extent of involvement with gambling.
8. Has jeopardized or lost a significant relationship, job, or educational or career opportunity because of gambling.
9. Relies on others to provide money to relieve desperate financial situations caused by gambling.

APPENDIX C

Problem gambling measures

C.1 PROBLEM GAMBLING SEVERITY INDEX (FERRIS AND WYNNE, 2001)

The Problem Gambling Severity Index is a 9-item scale and has been the most widely-used measure of the population prevalence of problem gambling in recent times.

Likert scale: never = 0, sometimes = 1, most of the time = 2, almost always = 3

Total aggregate score possible = 27; score of 8+ means problem gambling

Some of the next questions may not apply to you, but please try to be as accurate as possible.

THINKING ABOUT THE LAST 12 MONTHS...

1. Have you bet more than you could really afford to lose? Would you say never, sometimes, most of the time, or almost always?
2. Still thinking about the last 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 criticized 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?

C.2 SOUTH OAKS GAMBLING SCREEN (LESIEUR AND BLUME, 1987)

The South Oaks Gambling Screen, developed in the 1980s, was for a period the most popular measure of problem gambling in population research.

1. Please indicate which of the following types of gambling you have done in your lifetime. For each type, mark one answer: 'not at all', 'less than once a week', or 'once a week or more'.
 - a. Played cards for money;
 - b. Bet on horses, dogs or other animals (in off-track betting, at the track or with a bookie);
 - c. Bet on sports (parlay cards, with a bookie, or at jai alai);
 - d. Played dice games (including craps, over and under, or other dice games) for money;
 - e. Went to casino (legal or otherwise);
 - f. Played the numbers or bet on lotteries;
 - g. Played bingo;
 - h. Played the stock and/or commodities market;
 - i. Played slot machines, poker machines or other gambling machines;
 - j. Bowled, shot pool, played golf or played some other game of skill for money.

2. What is the largest amount of money you have ever gambled with on any one day?
 - Never have gambled;
 - \$10 or less;
 - More than \$10 up to \$100;
 - More than \$100 up to \$1,000;
 - More than \$1,000 up to \$10,000;
 - More than \$10,000.

3. Do (did) your parents have a gambling problem?
 - Both my father and mother gamble (or gambled) too much;
 - My father gambles (or gambled) too much;
 - My mother gambles (or gambled) too much;
 - Neither one gambles (or gambled) too much.

4. When you gamble, how often do you go back another day to win back money you have lost?
- _____ Never _____ Most of the Times I Lose
- _____ Some of the Time _____ Every Time I Lose
- (less than half the time I lose)
5. Have you ever claimed to be winning money gambling, but weren't really? In fact, you lost?
- _____ Never
- _____ Yes, less than half the time I lost
- _____ Yes, most of the time
6. Do you feel you have ever had a problem with betting or money gambling?
- _____ No _____ Yes _____ Yes, in the past, but not now
7. Did you ever gamble more than you intended to? _____ Yes _____ No
8. Have people criticized your betting or told you that you had a problem, regardless of whether or not you thought it was true?
- _____ Yes _____ No
9. Have you ever felt guilty about the way you gamble, or what happens when you gamble? _____ Yes _____ No
10. Have you ever felt like you would like to stop betting money on gambling, but didn't think you could? _____ Yes _____ No
11. Have you ever hidden betting slips, lottery tickets, gambling money, IOUs, or other signs of betting or gambling from your spouse, children or other important people in your life? _____ Yes _____ No
12. Have you ever argued with people you live with over how you handle money? _____ Yes _____ No

13. (If you answered Yes to question 12): Have money arguments ever centred on your gambling? _____ Yes _____ No

14. Have you ever borrowed from someone and not paid them back as a result of your gambling? _____ Yes _____ No

15. Have you ever lost time from work (or school) due to betting money or gambling? _____ Yes _____ No

16. If you borrowed money to gamble or to pay gambling debts, who or where did you borrow from (check 'Yes' or 'No' for each):
 - a. From household money _____ Yes _____ No
 - b. From your spouse _____ Yes _____ No
 - c. From other relatives or in-laws _____ Yes _____ No
 - d. From banks, loan companies, or credit unions _____ Yes _____ No
 - e. From credit cards _____ Yes _____ No
 - f. From loan sharks _____ Yes _____ No
 - g. You cashed in stocks, bonds or other securities _____ Yes _____ No
 - h. You sold personal or family property _____ Yes _____ No
 - i. You borrowed on your checking accounts (passed bad checks) _____ Yes _____ No
 - j. You have (had) a credit line with a bookie _____ Yes _____ No
 - k. You have (had) a credit line with a casino _____ Yes _____ No

Scores on the SOGS are determined by scoring one point for each question that shows the 'at risk' response indicated and adding the total points.

- Question 1 Not counted
- Question 2 Not counted
- Question 3 Not counted
- Question 4 _____ Most of the time I lose or Yes, most of the time
- Question 5 _____ Yes, less than half the time I lose or Yes, most of the time
- Question 6 _____ Yes, in the past but not now or Yes
- Question 7 _____ Yes

- Question 8 Yes
- Question 9 Yes
- Question 10 Yes
- Question 11 Yes
- Question 12 Not counted
- Question 13 Yes
- Question 14 Yes
- Question 15 Yes
- Question 16 a Yes
- Question 16 b Yes
- Question 16 c Yes
- Question 16 d Yes
- Question 16 e Yes
- Question 16 f Yes
- Question 16 g Yes
- Question 16 h Yes
- Question 16 i Yes
- Question 16 j Not counted
- Question 16 k Not counted

TOTAL

POINTS:

(Maximum score = 20)

INTERPRETING THE SCORE:

- 0: No problem with gambling
- 1-4: Some problems with gambling
- 5: or more Probable pathological gambler.

C.3 SOGS-R (ABBOTT AND VOLBERG, 1996)

Same as above SOGS, except 'Individuals who responded positively to original SOGS (lifetime) questions were asked if this also applied during the past six months. In addition to identifying lifetime and current probable pathological gamblers (scores of five or more on the respective scales), people who scored three or four were considered to experience gambling problems of less severity and in some

analyses, the full scale range was treated as a continuous measure. The preliminary, non-scored section of the SOGS was also expanded to collect more detailed information about gambling frequency and expenditure.' (Abbott and Volberg, 1996).

C.4 DSM-IV CRITERIA (AMERICAN PSYCHIATRIC ASSOCIATION, 1994)

This measure of problem gambling is taken directly from the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders IV.

IN THE PAST YEAR...

1. is preoccupied with gambling (e.g. preoccupied with reliving past gambling experiences, handicapping or planning the next venture, or thinking of ways to get money with which to gamble);
2. needs to gamble with increasing amounts of money in order to achieve the desired excitement;
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 (e.g. feelings of helplessness, guilt, anxiety, depression);
6. after losing money gambling, often returns another day to get even ('chasing' one's losses);
7. lies to family members, therapist, or others to conceal the extent of involvement with gambling;
8. has committed illegal acts such as forgery, fraud, theft, or embezzlement to finance gambling;
9. has jeopardized or lost a significant 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.

Meeting 5+ of these criteria is classed as pathological gambling (or gambling disorder as it is now known), meeting 3-4 of these criteria is usually classed as problem gambling (Calado and Griffiths, 2016).

APPENDIX D

Indirect Question techniques – list experiments, RRT and crosswise models

List experiments, first introduced by Droitcour Miller (1984) and sometimes also called item count technique or unmatched count technique experiments, typically involve asking participants to state the total number of questions in a list for which ‘yes’ is the true answer for them, without indicating which particular questions they answer ‘yes’ to (Blair et al., 2020). One group of participants will receive a list of non-sensitive questions, while the other group will receive the same list plus one sensitive question. There is no way for the researcher to know whether a participant in the latter group responded ‘yes’ or ‘no’ to the sensitive question, unless they respond that all, or none, of the questions were ‘yes’ for them. The aggregate prevalence of affirmative responses to the sensitive question can be estimated by comparing the mean number of affirmative statements for each group. Meta-analysis of studies that compare list experiment prevalence estimates to those obtained from direct questions (i.e. asking the sensitive question directly) show that, relative to direct estimates, list experiments on average reduced underreporting of socially undesirable behaviour and attitudes (4 percentage points higher estimates), and reduced overreporting of socially desirable behaviours and attitudes (12 percentage points lower estimates) (Blair et al., 2020). List experiments previously run in Ireland have shown evidence for social desirability bias in reporting of attitudes towards some immigrant groups (McGinnity et al., 2020), support for disability policy (Timmons et al., 2023) and COVID-19 mitigation behaviour (Timmons et al., 2021).

The random response technique (RRT), first introduced by Warner (1965), uses randomisation to allow participants to conceal their true behaviour or attitudes (Lensvelt-Mulders et al., 2005). Typically, participants are told to give a forced response to a sensitive question if one random event occurs, and their true response if another random event occurs. For instance, the participant is asked to roll a die, the outcome of which is known only to the participant. They are instructed to answer ‘no’ if a one comes up, ‘yes’ if a six comes up, and to give their true response if two, three, four or five comes up (Blair et al., 2015). Only the participant knows whether they have given their true response or a forced response. However, as the probabilities related to die-roll outcomes are known, the aggregate mean true response to the sensitive question can be estimated by the researcher. A meta-analysis of studies comparing RRT prevalence estimates to direct estimates show that RRT leads to less underreporting of undesirable behaviours and attitudes and less overreporting of desirable behaviours and attitudes, with a difference of 0.23-0.39 standard deviations between RRT and direct estimates (Lensvelt-Mulders et al., 2005). Additionally, a meta-analysis of six

RRT validation studies, where RRT and direct question estimates are compared to the known population prevalence, show that RRT reduces the difference between the known population prevalence and the estimated prevalence from 49 per cent for direct questions to 38 per cent for RRT (Lensvelt-Mulders et al., 2005).

Finally, crosswise models (CM), first introduced by Yu et al. (2008), involve presenting the participant with both a non-sensitive question for which the probability of affirmative answers is (approximately) known in the aggregate, and a sensitive question (Sagoe et al., 2021; Schnell and Thomas, 2021). The participant is asked which of the following two options applies to them: (a) their answer to both the sensitive and non-sensitive questions is the same (i.e. both 'yes' or both 'no') or (b) their answers are different. As the probability of affirmative answers to the non-sensitive question is known in the aggregate, the aggregate prevalence of affirmative answers to the sensitive question can be estimated. The most common non-sensitive question used relates to birthdays (Sagoe et al., 2021). An example is 'Was your mother born in February, April or November?' (Canan et al., 2021). Meta-analyses show that estimates of the prevalence of sensitive behaviours using CM are subject to less underreporting of undesirable behaviours and attitudes and less overreporting of desirable behaviours and attitudes, with the difference between CM estimates and direct estimates being estimated at half a standard deviation (Sagoe et al., 2021) and 4.9 percentage points (Schnell and Thomas, 2021).

A number of studies compare these three indirect question techniques. CM has been shown to perform better than list experiments (Jerke et al., 2022) and RRT (Höglinger and Jann, 2018). RRT has been shown to outperform list experiments in one study (Rosenfeld et al., 2016) but perform less well than list experiments in another study (Coutts and Jann, 2011).

Drawbacks specific to RRT are that it requires that participants have some understanding of probabilities and have access to a trustworthy randomisation device (Gregori and de Jong, 2023), and RRT is prone to false negatives, non-response and limited participant trust (Coutts and Jann, 2011). List experiments need to be designed carefully such that the participant's sensitive answer is not revealed, for example if the participant's true answer to both the non-sensitive and sensitive questions are all affirmative or all negative. CM can lead to increased false positives (Höglinger and Jann, 2018) and may not perform as well in less-educated samples (Schnell and Thomas, 2021). This last point may be of particular concern if the sensitive behaviour or attitude being measured is associated with education, as the evidence suggests is the case for PG.

Bahadivand et al. (2020) use a list experiment to elicit the prevalence of gambling and other risky behaviours among women in central Iran. They asked one group of participants to state how many of a list of five non-sensitive statements applied to them (e.g. 'I have more than one sister') and asked the second group to state how many statements applied to them from the same list of statements plus a sensitive statement. In the case of gambling, the sensitive statement was 'I have been betting money or anything of value during this year'. Prevalence of past-year gambling was estimated at 7.5 per cent by comparing mean responses between the first and second groups.

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