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MEASURES OF PROBLEM GAMBLING, GAMBLING BEHAVIOURS AND PERCEPTIONS OF GAMBLING IN IRELAND

The figure of 3.3% equates to 1 in 30 adults, or 130,000 people, with Problem Gambling in Ireland. In addition, the report records a further 7.1% (95% confidence interval: 6.0–8.2%) of the adult population who report multiple problematic behaviours and experiences but fall short of the threshold for Problem Gambling (i.e., they show moderate evidence of PG). This equates to 279,000 people with moderate evidence of PG. The report record another 15% (confidence interval: 13.4–16.5%) of adults (590,000) who report at least one negative experience or behaviour.

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Childhood gambling experiences and adult problem gambling

Diarmaid Ó Ceallaigh[a*], Shane Timmons[a,b], Deirdre Robertson[a,b], Pete Lunn[a,c]

a) Economic and Social Research Institute, Dublin, Ireland
b) School of Psychology, Trinity College Dublin, Dublin, Ireland
c) Department of Economics, Trinity College Dublin, Dublin, Ireland

*Corresponding Author:
Diarmaid Ó Ceallaigh
Economic and Social Research Institute,
Whitaker Square, Sir John Rogerson's Quay,
Dublin, Ireland
Email: diarmaid.oceallaigh@esri.ie

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Non-technical summary

Many countries are now increasing regulation of the gambling industry. A cornerstone of these regulatory efforts is the protection of children. Gambling is generally viewed as an age-inappropriate activity for children and there is an assumption that exposure to gambling as a child increases the risk of problem gambling (PG) in later in life. PG is when a person's gambling is disruptive and damaging to their lives, with negative repercussions on their finances, wellbeing and social circles.

Such regulation may reduce the profitability of a sector that generates considerable revenue and employment. It is therefore important that regulation is grounded in evidence from high-quality research on the impact of exposing children to gambling. In this study we test if adults who were more exposed to gambling as children are more likely to have PG. We do this using an online survey with a nationally representative sample of 1,663 adults in Ireland. The survey measured participants' PG and asked them if they had gambled before the age of 18, how much their parents gambled while they were growing up, and what was their parents' general attitude towards gambling.

Almost two-in-three adults (64%) report having gambled before turning 18. Playing slot machines was the most common form of gambling for money as a child (33%). This was followed by scratch cards (31%), horse or dog betting (27%), gambling amongst friends (23%), bingo (20%), and lotteries (20%). We find some differences between age cohorts: scratch cards, sports betting and loot boxes in video games were more prevalent forms of childhood gambling among the under 40s, while slots were more prevalent for those aged 40 plus.

Regarding our primary research question, we find strong links between childhood experiences of gambling and PG in adulthood. Those who gambled before the age of 18 are almost twice as likely to have PG, as are those who had a parent who gambled with high intensity during the person's childhood. Those whose parents had a more positive attitude towards gambling are also at an increased risk of having PG.

Having had one parent who gambled is linked to an increased chance of PG of about a third, relative to having no parent who gambled. This link is much stronger among those aged 40 or more, compared to the under 40s. Having had two parents who gambled is not linked to an increased chance of PG in the full sample, but is among the 40 plus age group. This weakening of the link between family-related factors and PG in the younger cohort may indicate changes to the sources of exposure to gambling among younger cohorts. Given the expansion of the gambling industry and growth of online gambling and advertising in particular, under 40s have been exposed to a much greater level of gambling accessibility and marketing during childhood than the 40 plus age group. The upshot may be that while parental gambling behaviour was previously a crucial factor in determining if a child will develop PG in adulthood, other factors have become more important.

Our study has implications for policy. The findings add to the weight of evidence for a link between childhood experiences of gambling and PG in adulthood. This in turn supports regulatory measures to minimise the exposure of children to gambling in order to reduce their risk of developing PG. These may include bans on children gambling or even entering a gambling premises, website or app. Strict, immediate age-verification safeguards may be warranted for digital gambling platforms. Assuming that advertising is at least to some degree effective, our findings also imply that the future level of PG may be reduced by minimising the exposure of children to gambling marketing, using measures such as a watershed ban on TV advertising, the prohibition of gambling advertisements that may be particularly attractive to children, and restrictions on sponsorship of events or clubs

where children are involved. Additionally, measures that protect parents from PG may indirectly help to reduce the risk of their children developing PG, given the links we find between parental gambling and later-life PG. One needs to bear in mind, however, that the influence of parents on PG risk appears to be weakening in younger age cohorts. This suggests that a focus on regulations that reduce the extra-familial exposure of children to gambling, such as regulation on accessibility and marketing, may be taking on greater importance.

The growing importance of extra-familial factors also has implications for PG treatment. It may mean that the profile of those seeking treatment is changing, with more people with no family history of gambling or PG presenting for treatment. Given this, future research on the changing profiles of PG treatment patients is warranted.

Abstract

Many countries are strengthening their regulation of the gambling industry. Measures to protect children from exposure to gambling are often an important component of regulation, as childhood exposure to gambling is thought to lead to problem gambling (PG) in adulthood. We report a pre-registered analysis of survey data from a nationally representative sample of adults in Ireland (*N* = 1,663). Almost two-in-three adults (64%) report having gambled before turning 18 and doing so is associated with an almost doubling of the risk of later-life PG. Having a parent who gambled and having parents with more positive attitudes towards gambling are also associated with increased risk of PG. Those who had a parent that gambled a lot are almost twice as likely to have PG. However, the relationship between parental behaviour and PG is weaker among younger age groups. Our findings support child-focused regulatory measures to restrict access and exposure to gambling for children.

Introduction

Problem gambling (PG) is gambling that is disruptive and damaging to a person's life, with negative repercussions on their finances, wellbeing and social circles. PG is an important public health issue in many countries (Reith et al., 2019; Wardle et al., 2021). For instance, the prevalence of PG in Ireland has been estimated at 3.3%, and at 2.5% in the UK (Ó Ceallaigh et al., 2023; UK Gambling Commission, 2023). The threat of PG has been exacerbated in recent years by the rapid growth in online gambling, the ubiquity of gambling advertising, and the development of new high-speed gambling products (Newall et al., 2019; Wardle et al., 2021). Policymakers have, in general, been slow to respond (Ukhova et al., 2023).

In an attempt to catch-up with these developments, many countries are now increasing regulation of the gambling industry. A cornerstone of many of these regulatory efforts is the protection of children. Gambling is generally viewed as an age-inappropriate activity for children and there is an assumption that exposure to gambling as a child increases the risk of PG later in life. While most countries prohibit children from gambling, regulation often further seeks to minimise the exposure of children to gambling marketing, or to ban gambling products or gambling-like activities (e.g. loot boxes in video games) that are particularly attractive to children. For instance, the UK has banned celebrities who may be of particular appeal to young people from appearing in gambling advertisements (Woodhouse, 2024), while proposed legislation in Ireland seeks to introduce a

watershed preventing gambling advertisements on TV and radio between 5.30am and 9.00pm (Houses of the Oireachtas, 2022).

Such regulation may have negative economic effects on a sector that generates considerable revenue and employment. It is therefore important that regulation is grounded in high-quality evidence on the impact of exposing children to gambling. Here, we test for a relationship between childhood experiences of gambling and adult PG, using an online survey with a nationally representative sample of 1,663 adults in Ireland. We measure participants' PG and their recall of childhood experiences of gambling. In particular, we ask participants about their experience of gambling before the age of 18, how much their parents gambled while they were growing up, and what was their parents' general attitude towards gambling. Using this data, we seek to answer the following confirmatory research question: are childhood experiences with gambling linked to increased risk of PG in later life? We also carry out additional exploratory analysis where we examine the links between childhood experiences and two other adult outcomes: gambling spend and attitudes towards gambling.

The remainder of this paper is structured as follows. The next section briefly reviews relevant international literature. This is followed by a brief overview of the gambling landscape in Ireland. We then describe our data and analysis plan before presenting the results and discussing the implications for policy.

Literature Review

Previous research suggests a link between starting to gamble in childhood and PG in later life, although the evidence is not conclusive. Cross-sectional studies from the US and UK show that, among adults with PG, starting to gamble earlier in life is associated with increased severity of PG (Burge et al., 2004, 2006; Sharman et al., 2019). Similarly, a large US general population study reports a link between early onset of gambling behaviour and likelihood of developing PG (Volberg, 1994). However, a different survey of young adult gamblers in the US finds no significant association between early onset of gambling behaviour and PG (Lynch et al., 2004).

The evidence from longitudinal studies is also mixed, although studies to date have been limited to assessing PG outcomes in adolescents and young adults. One meta-analysis of longitudinal studies reports that starting to gamble earlier in life is not significantly associated with PG (Dowling, Merkouris, et al., 2017). The estimated meta-correlation between the two variables is 0.13 with a 95% confidence interval of (−0.01, 0.28), indicating that this null finding is not conclusive. Indeed, of the studies included in the meta-analysis, half record a significant association between early gambling and later PG.

As to whether parental gambling behaviour increases the risk of PG, the existing evidence strongly suggests that this is the case. Cross-sectional studies from Australia, the UK, the USA and Canada find that adults that had a parent who had PG or who gambled frequently during the participant's childhood are more likely themselves to have PG (Delfabbro & Thrupp, 2003; Dowling et al., 2010, 2018; Oei & Raylu, 2004; Wardle, 2007; Wickwire et al., 2007; R. J. Williams et al., 2023). Children whose parents had PG have also been shown to be more likely to themselves have PG in studies from Italy, Australia, and Canada (Donati et al., 2023; Dowling et al., 2010; Dowling, Shandley, et al., 2017; Vachon et al., 2004; Vitaro et al., 2008). These findings are supported by a longitudinal study from the US that tracks its sample from adolescence to young adulthood (Winters et al., 2002). Nevertheless, one recent Australian study among adults who had at least one parent that gambled does not find a link between their PG and that of their parents (Suomi et al., 2024).

The evidence base for the link between PG and parents' attitudes towards gambling is not as well developed as that for the abovementioned relationships. A study from the US found that adolescents whose parents disapproved of gambling were less likely to have PG (Wickwire et al., 2007). In contrast, another US study and an Australian study find no significant relationship between adolescent PG and parents' attitudes towards gambling (Delfabbro & Thrupp, 2003; Leeman et al., 2014). These two studies do find, however, that adolescents gamble more frequently if their parents are more approving of gambling. These studies all focus on adolescent outcomes; there is a dearth of evidence on the link between PG in adulthood and parental attitudes.

This brief summary of the existing research highlights gaps in the evidence base on childhood gambling experiences and PG that our study seeks to address. Firstly, the bulk of the existing evidence comes from unrepresentative samples – less than a fifth of the studies cited above use representative general population samples. Secondly, the vast majority of previous research has been carried out using in-person or telephone survey methods, whereas our survey is carried out online. Measuring PG online, as opposed to face-to-face or over the phone, has considerable advantages because it mitigates social desirability bias (Ó Ceallaigh et al., 2023). Social desirability bias occurs when survey respondents provide answers they think will be viewed positively by others, and is particularly problematic for sensitive topics like PG (Nederhof, 1985). People may be more willing to divulge the full extent of their PG online, rather than in-person or over the phone, as an online survey gives greater anonymity (Krumpal, 2013).

Thirdly, as noted already, there are conflicting findings, particularly as regards the importance of early gambling and parental attitudes. More evidence is needed to resolve these conflicts, something that this study provides. Indeed, in the case of parental attitudes, there is a clear lack of evidence. Furthermore, it is possible that the discrepancies in findings in previous research are in part driven by the sampling and social desirability bias issues just discussed. Therefore, the evidence we provide takes on particular importance, given that our sample and survey design goes a long way towards addressing these issues.

The gambling landscape in Ireland

Gambling is a large industry in Ireland. In 2019, total revenue in Ireland from gambling (before winnings are subtracted) was estimated at €6-8 billion (Inter-Departmental Working Group on Future Licensing and Regulation of Gambling, 2019). This represented about 2% of GDP (Central Statistics Office, 2020). While land-based casinos are for the most part banned in Ireland,[1] all of the other main forms of land-based gambling are legal. Online gambling is also legal, including online casino gambling.

Around three-quarters of adults in Ireland report engaging in some form gambling in the previous month, with just under two thirds doing so through in-person means, and over a third doing so online (Ó Ceallaigh et al., 2023). The most widely played in-person forms of gambling are, in order of popularity: lotteries, scratch cards, horse and dog-betting, sports betting, slot machines and bingo. As for online, sports betting is the most popular form, followed by horse and dog betting, slots, lotteries, scratch cards, bingo and casino gambling.

[1] At the time of writing, casinos that are open to the public are prohibited in Ireland. However, a loophole in the existing legislation, the Gaming & Lotteries Act, 1956 (Houses of the Oireachtas, 1956), allows for casinos to operate as private members clubs.

An estimated 3.3% of adults in Ireland have PG (Ó Ceallaigh et al., 2023). Another 7.1% suffer from multiple negative gambling experiences and behaviours, but are below the threshold to be classified as having PG. A new Gambling Regulation Bill is currently going through the Irish legislative process, and represents the first major overhaul of gambling laws in Ireland since 1956 (Houses of the Oireachtas, 2022). This Bill proposes to strengthen regulation of gambling in Ireland considerably, and contains provisions that directly target the protection of children. These include the prohibition of sponsorship of organisations, such as sports teams, in which children are members, as well as the previously mentioned watershed ban on gambling advertising on TV and radio.

Only a small number of studies have examined childhood gambling in Ireland. 23% of 16 year-olds have gambled for money in the previous 12 months, while 3% show signs of excessive gambling (McAvoy et al., 2023).[2] Among young males, those who play team sports are more likely to gamble regularly and to gamble online (Duggan & Mohan, 2022). Half of adults entering treatment for PG in Ireland began gambling before the age of 17, and a fifth lived with dependent children (Condron et al., 2022).

Methods

Our analysis plan was pre-registered on the OSF website at https://osf.io/us459/.

Sample and recruitment

The data for this study come from an online survey of a nationally representative sample of 3,000 adults in Ireland in July and August 2023 (Ó Ceallaigh et al. 2023). The survey included measures of gambling activity, PG, childhood experiences and perceptions of gambling. Participants were recruited through three online panels managed by leading market research agencies in Ireland. Ó Ceallaigh et al. (2023) carried out multiple checks that demonstrated the representativeness of the sample and the reliability of the PG and gambling activity survey measures.

Participants from one of the panels received a shortened version of the survey that did not measure all of the variables needed for the present study. Therefore, we focus on the data for the 2,000 participants from the other two panels. These participants were paid €3 for participating in the survey. Of these 2,000 participants, we exclude 116 participants who failed an attention check within the survey. We also exclude a further 221 participants for whom we have incomplete data, leaving a sample size for analysis of 1,663.

Measures

The survey questions used to measure the dependent and explanatory variables are shown in the Appendix section “Survey questions”.

[2] ‘Excessive gambling’ was measured in this study using an adapted version of the three-item Consumption Screen for Problem Gambling (Rockloff, 2012). This asked participants about their gambling behaviour over the previous year. Specifically, it asked how often they had gambled, how much time they spent gambling on a typical day on which they gambled, and how often they spent two or more hours gambling at a time.

Dependent variables

PG

PG is the main dependent variable that we use in our analysis. We measured PG using the Problem Gambling Severity Index (PGSI) (Ferris & Wynne, 2001), which is the current international standard for measuring PG in general population samples (Abbott & Volberg, 2006; Caler et al., 2016). Participants rated how often nine different gambling behaviours and experiences applied to them over the previous 12 months, using a four-point Likert scale: "never", "sometimes", "most of the time", "almost always". In accordance with convention, we calculate a score for each participant based on their responses, with each "never" answer contributing zero to the score, each "sometimes" contributing one, "most of the time" contributing two, and "almost always" contributing three. We then use a participant's aggregate score to categorise them into one of four categories as is the standard in research using the PGSI: "no evidence of PG" (PGSI score = 0), "some evidence of PG" (1-2), "moderate evidence of PG" (3-7), have PG (8 or more). This gives us an ordered four-category variable for analysis.

Note that our labels for these categories are slightly different from the standard labels used in gambling research. The two middle categories are usually labelled "low risk" and "moderate risk" in studies using the PGSI. However, we relabel them "some evidence of PG" and "moderate evidence of PG". This is because describing a person as "low risk" or "moderate risk" may be misinterpreted as implying that the person is currently free of problematic gambling behaviour and experiences, but is *at risk* of developing problematic gambling in the future (Ó Ceallaigh et al., 2023). However, a person who scores one or more on the PGSI is by definition currently reporting at least some problematic gambling behaviour or some negative experiences associated with gambling.

Gambling spend

We also use gambling spend per week as a dependent variable in some exploratory analysis. We asked participants how much money on average they spent on gambling per week over the previous month. Those who did not gamble in the previous month are given a zero for this variable.

Attitudes towards gambling

We measured a participant's attitudes towards gambling using the Attitudes Towards Gambling-8 scale (Canale et al., 2016; Orford et al., 2009)**.** The participant rated their agreement, on a five-point rating scale, with eight statements such as "people should have the right to gamble whenever they want" and "there are too many opportunities for gambling nowadays". Statements such as the latter that imply a negative attitude towards gambling are reverse-coded, and the mean rating across the eight items is then calculated. A higher mean rating implies a more positive attitude towards gambling. We standardize this mean rating for use in our regression analysis.

Explanatory variables

Childhood gambling

We asked participants what forms of gambling they had spent money on before the age of eighteen. Participants chose from a list of 12 different forms of gambling such as lottery, bingo, and sports betting. In our main confirmatory analysis, we use a binary indicator variable equal to one if the

participant reported engaging in any form of gambling before eighteen, and equal to zero if not. In exploratory analysis we additionally use a set of 12 binary indicator variables – one for each different form of childhood gambling.

Number of parents who gambled

We asked participants how many, if any, of their parents gambled during their childhood. In our analysis, we use a binary indicator variable equal to one if exactly one parent gambled and equal to zero otherwise, and another binary indicator variable equal to one if two parents gambled. The reference category in analysis is having no parents that gambled.

Intensity of parent gambling

Participants with one parent who gambled rated how often their parent gambled on a seven-point rating scale from 1 "Very rarely" to 7 "Always". They also rated how often their parent gambled relative to the average person on a seven-point scale from 1 "A lot less" to 7 "A lot more". If a participant had two parents who gambled, we instructed them to respond to these questions for the parent who gambled the most.

For each participant for whom at least one parent gambled, we calculate the mean of the ratings the participant gave for the two single-item scales described in the previous paragraph. As pre-registered, we then categorise participants according to that rating. Those whose mean rating is less than or equal to the sample median are categorised as having a parent whose gambling intensity was low. Those with a mean rating above the median are categorised as having a parent whose gambling intensity was high. In our main analysis, we use a binary indicator variable for having a low-intensity gambling parent, and a binary indicator variable for having a high-intensity gambling parent. The reference category is having no parent who gambled.

Parental attitudes towards gambling

Participants rated their agreement with the statement "while I was growing up, my parents/guardians approved of gambling" on a seven-point rating scale from 1 "Strongly disagree" to 7 "Strongly agree".[3] We standardize this score for use in our regression analysis.

Control variables

We control for the following sociodemographic variables in our regression analyses: gender, age, education, born in Ireland or not, ethnicity, living in an urban or rural area, region of residence.

Statistical analysis

Confirmatory analysis

Our main confirmatory analysis tests for relationships between PG, as the dependent variable, and the explanatory variables listed above. Given that PG is an ordered categorical variable, the conventional approach would be to use an ordered logistic regression. This model estimates how the odds of being at or above a given threshold category of the dependent variable change as the value of a given explanatory variable changes. For instance, it can tell us how the odds of having at least moderate evidence of PG, relative to having some or no evidence of PG, change as age increases.

[3] Participants also had the option to select "don't know" or "not applicable" for this question.

This model assumes proportional odds; the estimated change in odds for a given change in an explanatory variable is assumed to be the same for all thresholds. In our case, this means that the change in the odds of a person having at least moderate evidence of PG when an explanatory variable increases by one unit is assumed to be the same as the change in odds of having at least some evidence of PG, or the change in odds of having PG, when the same explanatory variable increases by one unit.

However, this proportional odds assumption is not satisfied for all explanatory variables in our data. For this reason, our analysis is carried out using a generalised ordered logistic/partial proportional odds regression model (Peterson & Harrell Jr, 1990; R. Williams, 2006). This is a generalisation of the ordered logistic model that allows for the proportional odds assumption to be violated for some or all of the explanatory variables. For explanatory variables for which the assumption is satisfied, the model constrains estimates of the change in odds for that variable to be the same across different thresholds of the dependent variable. When the assumption is not satisfied, the estimated change in odds is allowed to vary.

A drawback of using partial proportional odds regression, and indeed of other forms of logistic regression, is that the effect sizes can be difficult to interpret. To aid interpretation, we therefore present average marginal effects derived from the partial proportional odds regression. The average marginal effect is the change in the probability that a person is in a given category of the dependent variable when there is a one-unit change in a given explanatory variable. As an example, the marginal effect of age on the "some evidence of PG" category is the increase/decrease in probability that a person is in that category if their age increases by one year. For a binary indicator variable, the marginal effect is the change in probability when the value of the binary indicator variable goes from zero to one (e.g. from "didn't gamble before turning 18" to "gambled before turning 18").

We also present marginal effects as a percentage of the baseline probability of being in a given PG category.[4] In our context, the baseline probability is the probability that a person is in a given PG category when the explanatory variable of interest is "turned off" or set to zero.[5] For example, the baseline probability used for the variable "gambled before 18" at the PG category "some evidence" is the probability that a person shows some evidence of PG if they had not gambled before the age of 18. The probability that a person shows some evidence of PG if they *had* gambled before 18 is then simply the sum of the baseline probability and the marginal effect.

Our confirmatory analysis uses the partial proportional odds regression to test several different hypotheses regarding the relationship between PG category and each of the explanatory variables listed previously. Testing several hypotheses simultaneously increases the risk of a type I error, or a false positive, in any one of the tests (Shaffer, 1995). In confirmatory analysis, it is necessary to adjust p-values (Bender & Lange, 2001). Therefore, in determining statistical significance in this confirmatory regression analysis, we correct for "multiple hypothesis testing" using the False Discovery Rate method (Benjamini et al., 2006; Benjamini & Hochberg, 1995).

Exploratory analysis

[4] When we say the "probability of being in a given PG category", we mean the average adjusted prediction or average adjusted margin related to that category. We use the former terminology for ease of exposition.
[5] For our continuous explanatory variable, parental attitudes, we use the mean as the baseline value. This is zero as we standardize the variable.

We carry out several pre-registered exploratory analyses where we further analyse the relationship between PG category and possible explanatory variables. We use the same model in these analyses as we do in our confirmatory analysis – partial proportional odds regression.

We also carry out an exploratory analysis with gambling spend as the dependent variable. Here we need to use a different regression model as gambling spend in our data is a count variable.[6] Additionally, there are a large proportion of zeros; in other words, people who spent no money on gambling. The large proportion of people with a zero gambling spend can be categorised into two types: those who never gamble, and those that gamble but did not do so in the month before our survey. Though we do not have explicit data to distinguish between these two types, we can use a zero-inflated Poisson regression to model gambling spend as a two-stage process: (1) whether a person never gambles, and (2) given that a person gambles, how much they spend (Lambert, 1992). We present average marginal effects derived from this model.

Finally, we carry out an exploratory analysis with a person's attitudes towards gambling as the dependent variable. Here we use an OLS regression.

In addition to these pre-registered exploratory analyses, we also carry out some additional exploratory analyses that were not pre-registered. This is done where doing so allows for greater insight into the results obtained from the pre-registered analyses.

Results

Descriptives

Table 1 shows descriptive statistics for each of the variables used in our regression analyses. 17% of our sample show some evidence of PG, 8% show moderate evidence and 4% have PG.[7] About two thirds reported gambling before the age of 18. 40% had at least one parent who gambled, with 30% having one parent and 10% having two parents who gambled.

Table 1: Descriptive statistics for the sample

Dependent variables	
PGSI category	
- No evidence	70%
- Some evidence	17%
- Moderate evidence	8%
- PG	4%
Spend per week (mean in €)	30.62

[6] Participants told us their average gambling spend per week to the nearest Euro.

[7] The PG prevalence of 4% is marginally higher than the PG prevalence of 3.3% estimated by Ó Ceallaigh et al. (2023), but is within the 95% confidence interval of this latter estimate. We deem this 3.3% estimate to be the best estimate of PG prevalence in Ireland.

Attitude towards gambling (mean on 5-point scale)	2.47
Explanatory variables	
Gambled before 18	65%
1 parent gambled, but not 2	30%
2 parents gambled	10%
Parent gambling – low	23%
Parent gambling – high	17%
Parental attitude towards gambling (mean on 7-point scale)	2.94
Control variables	
Male	48%
Female	52%
Age	
- Under 40	35%
- 40-59	39%
- 60+	26%
Highest education	
- High school or less	29%
- Tertiary qualification less than a degree	29%
- Degree or higher	42%
Born in Ireland	84%
Ethnicity	
- White Irish	86%
- Other white	10%
- Other	4%
Live in urban area	66%
Region of residence	
- Dublin	28%
- Rest of Leinster	27%
- Munster	28%
- Connacht/Ulster	17%

Notes: N=1,663. Unweighted estimates. Shows proportion of sample satisfying a given criteria unless otherwise indicated.

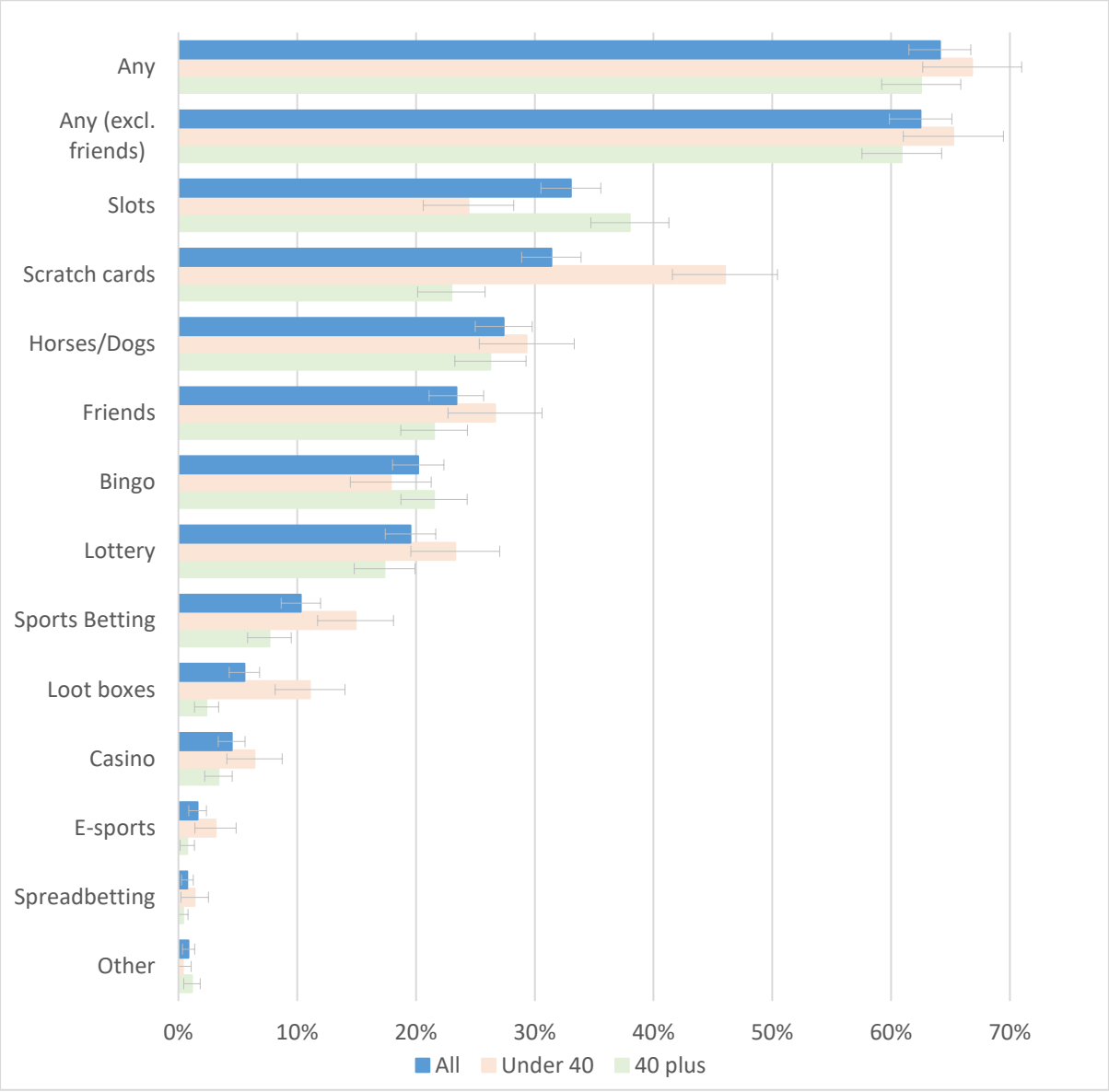
Appendix Table A 1 compares the composition of our sample against the last census of population carried out in 2022 (Central Statistics Office, 2023). Our sample is nationally representative in terms of gender and age. Those with a high school education or less are a little underrepresented in our sample, while those with a degree or more are a little overrepresented. In the descriptive analysis that follows, we use sample weights to improve representativeness. Weights are calculated using the raking method with population statistics on age, gender and education from the 2022 census (Deming & Stephan, 1940; Deville & Särndal, 1992).

Figure 1 shows the proportion of our sample who engaged in various forms of gambling before the age of 18. Slots was the form of gambling that most people had played for money before 18 (33%). This was followed by scratch cards (31%), horse or dog betting (27%), gambling amongst friends (23%), bingo (20%), and lotteries (20%).

In Ireland, PG is much more prevalent among those under 40 years of age than those aged 40 or older (Ó Ceallaigh et al., 2023). This may be either an age effect or a cohort effect. An age effect

implies that as people get older, they become less susceptible to PG. A cohort effect, on the other hand, implies that younger generations are more susceptible to PG, perhaps due to increased gambling accessibility and marketing during their formative years. With this in mind, Figure 1 also shows the proportion of people in each of these age cohorts who had engaged in each form of underage gambling. Overall, we find no difference between cohorts in the proportion who reported gambling as a child, although scratch cards, sports betting and loot boxes are more prevalent forms of childhood gambling among the under 40s, while slots are more prevalent for those aged 40 plus.

Figure 1: Proportion of people who gambled before turning 18 – by form of gambling



Notes: N=1,663. Under 40 N=583, 40 plus N=1080. 95% confidence intervals shown. Weighted estimates. Note that the presentation of the descriptives by age cohort was not pre-registered.

Appendix Figure A 1 shows the proportion of people who gambled before turning 18 by present income bracket. Overall, we see little to suggest here that those with lower incomes are more or less likely to have gambled before 18. Appendix Figure A 2 shows the distribution of the sample based on how many forms of gambling they had engaged in before 18. Almost half of the sample had engaged in two or more forms, while a tenth had engaged in 5 or more. Overall, there are no differences between age cohorts in the number of forms engaged in.

Confirmatory analysis

The results of the regression analysis of the relationship between PG category and our explanatory variables of interest are shown in Tables 2 and 3. We pre-registered a single regression to analyse all of these relationships. However, collinearity between the "one parent gambled" indicator and the "parent gambling – high" indicator in our data means that we need to analyse these two variables separately. Thus, we run two separate regressions, one with the "number of parents who gambled" indicator variables (Table 2) and another with the "intensity of parent gambling" indicator variables (Table 3). We include both the "gambled before 18" and "parental attitudes towards gambling" variables in each regression, as well as the control variables, to isolate independent associations for each of the explanatory variables of interest, to the extent possible.

Table 2: Marginal effects on PG of childhood gambling, number of parents who gambled, and parental attitudes towards gambling.

	Problem Gambling Category			
	No evidence	Some evidence	Moderate evidence	PG
Gambled when under 18	-0.118***	0.056***	0.039***	0.023***
	[-0.163,-0.074]	[0.033,0.079]	[0.024,0.055]	[0.014,0.032]
	-15%	*41%*	*67%*	*83%*
One parent gambled	-0.059**	0.026**	0.021**	0.013**
	[-0.109,-0.009]	[0.004,0.047]	[0.003,0.038]	[0.002,0.024]
	-8%	*16%*	*26%*	*33%*
Two parents gambled	0.005	-0.002	-0.002	-0.001
	[-0.067,0.077]	[-0.034,0.030]	[-0.026,0.023]	[-0.016,0.014]
	1%	*-1%*	*-2%*	*-2%*
Parental attitudes	-0.022**	0.012	-0.005	0.016***
	[-0.045,0.000]	[-0.006,0.030]	[-0.018,0.008]	[0.006,0.025]
	-3%	*7%*	*-6%*	*40%*
N	1663	1663	1663	1663

Table shows average marginal effects obtained from generalised ordered logit/partial proportional odds regression analysis. Regression model includes controls listed in the Methods section. 95% confidence interval for each average marginal effect in square brackets. The average marginal effect as a percentage of the baseline probability (i.e. adjusted margin when the explanatory variable is set to zero) is shown in italics below each confidence interval. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. P-values adjusted for multiple testing using the FDR method.

Table 3: Marginal effects on PG of each of childhood gambling, intensity of parent gambling, and parental attitudes towards gambling.

	PG Category			
	No evidence	Some evidence	Moderate evidence	PG
Gambled when under 18	-0.123***	0.059***	0.041***	0.024***
	[-0.168,-0.079]	[0.036,0.081]	[0.026,0.056]	[0.015,0.033]
	-16%	*44%*	*71%*	*87%*
Parent gambling – low	-0.011	0.048**	-0.021	-0.016*
	[-0.065,0.042]	[0.003,0.094]	[-0.051,0.010]	[-0.037,0.005]
	-2%	*30%*	*-23%*	*-34%*
Parent gambling – high	-0.128***	0.053***	0.046***	0.029***
	[-0.195,-0.061]	[0.027,0.078]	[0.020,0.073]	[0.012,0.047]
	-18%	*32%*	*60%*	*80%*
Parental attitudes	-0.007	0.005	-0.01*	0.012**
	[-0.031,0.017]	[-0.013,0.023]	[-0.023,0.003]	[0.003,0.022]
	-1%	*3%*	*-11%*	*31%*
N	1663	1663	1663	1663

Table shows average marginal effects obtained from generalised ordered logit/partial proportional odds regression analysis. Regression model includes controls listed in the Methods section. 95% confidence interval for each average marginal effect in square brackets. The average marginal effect as a percentage of the baseline probability (i.e. adjusted margin when the explanatory variable is set to zero) is shown in italics below each confidence interval. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. P-values adjusted for multiple testing using the FDR method.

PG and having gambled before 18: The results for the relationship between PG and having gambled before 18 are almost identical in both regressions. For ease of exposition, we focus on the first regression (Table 2).

The first marginal effect that we see in Table 2 is that of having gambled before 18 on the "no evidence of PG" category. This marginal effect of -0.118 means that having gambled before 18 reduces the probability of a person showing no evidence of PG by 11.8 percentage points (ppt). This reduction equates to the difference between two probabilities derived from the regression model: the probability that a person shows no evidence of PG if they have not gambled before 18, and the probability if they *have*. The former probability is 77.8%. We call this the *baseline probability.* The latter probability is 66.0%. The difference is a reduction of 11.8 ppt, which is our marginal effect. Table 2 also shows, in italics, each marginal effect as a percentage of the baseline probability. In this case, the marginal effect is -15% when expressed as a percentage of the baseline probability (i.e. -11.8/77.8). For ease of exposition, in the text that follows we refer to marginal effects expressed in this way (i.e. as a percentage of the baseline probability).

Having gambled before 18 is associated with an increased probability of a person being in each of the other three categories of PG. Gambling before 18 increases the probability of having some evidence

of PG by 41%, increases the probability of having moderate evidence by 67%, and increases the probability of having PG by 83%. All of these effects are statistically significant.

In sum, having gambled before 18 is associated with an increase in the probability that a person shows some or moderate evidence of PG, and almost doubles their probability of having PG.

Number of parents who gambled: The effects of having one parent who gambled, relative to having no parents who gambled, are all statistically significant (Table 2). These effects are in the same direction as the effects of having gambled before 18, but are smaller. Relative to having no parent who gambled, having one gambling parent increases the probability of some evidence of PG by 16%, moderate evidence by 26%, and PG by 33%.

In contrast, the effect of having two gambling parents on PG category, relative to having no parents who gambled, is not statistically significant. There are three possibilities here. Firstly, there may truly be no relationship between having two parents who gambled and PG. Alternatively, a relationship may exist but we may be underpowered to detect it in our analysis, given that only 10% of our sample had two parents who gambled. Finally, collinearity between having two parents that gambled and underage gambling or parental attitudes may attenuate the estimated effect of having two parents that gambled. However, when we run the regression model without the underage gambling or parental attitudes variables, we still find no significant relationship between having two parents that gambled and PG.

Intensity of parent gambling: We find little support for a link between PG and having a parent who gambled with low intensity (Table 3). Only one of the effects is significant – having a parent who gambled with low intensity increases the probability of having some evidence of PG by 30%, relative to having no parents who gambled.

In contrast, we find strong support for a link between PG and having a parent who gambled with high intensity. The effects on PG are almost identical to those of having gambled before 18, both in direction and magnitude. Relative to having no parent who gambled, having a parent who gambled with high intensity increases the probability of having some evidence of PG by 32%, moderate evidence by 60%, and PG by 80%. All of these effects are statistically significant.

Parental attitude towards gambling: The marginal effects for the parental attitudes variable need to be interpreted slightly differently than the marginal effects of the other explanatory variables we have analysed. This is because parental attitudes is a standardised continuous variable, whereas the other variables are all binary. In the case of parental attitudes, the marginal effect is the change in probability when parental attitude goes from its average value to being one standard deviation above average.

A one standard deviation increase in parental attitude from its average increases the probability of having PG by 40% in regression 1 (Table 2). It has a similar effect on having PG in the second regression (Table 3: 31%). In both cases this effect is significant. Parental attitude does not have a significant effect on the probability of having some or moderate evidence of PG.

Robustness check: As a robustness check, we reran these regression analyses excluding participants who had not gambled in the previous month. This left us with a sample of 1270 participants who had gambled in the previous month. This produced no substantive difference in results.

Exploratory analysis

We analysed the relationship between PG and engaging in various forms of underage gambling. The results are shown in Table 4, where the forms of gambling are listed in order of popularity, from the form with the highest proportion of people engaging in it before 18 (slots) to the form with the lowest proportion (spread betting). Gambling with friends, sports betting, casino gambling and e-sports betting are all significantly associated with a reduced probability of having no evidence of PG, and in turn are significantly associated with an increased probability of showing some evidence, moderate evidence and PG. Loot boxes and spread betting are also associated with a decreased probability of no evidence and an increased probability of some evidence, as well as an increased probability of moderate evidence in the case of loot boxes.

Interestingly, the forms of gambling that have a lower proportion of people engaging in them before 18 seem to be those most strongly associated with PG. Given that the number of people who engaged in several of these forms is very low, these results need to be interpreted with caution. However, the results raise the possibility that these low-prevalence forms of underage gambling are the most harmful in terms of increasing the risk of PG in adulthood. Alternatively, these forms of gambling may act as mediators between more popular forms of gambling and PG. According to this line of thinking, the higher prevalence forms of gambling may act as a "gateway", giving lots of children their first experience of gambling. Some of these children then progress onto the more niche, lower prevalence forms of gambling, which we find are linked to susceptibility to PG in adulthood. If so, the coefficient estimates for the higher prevalence forms might be underestimated in our analysis. To check this, we run a mediation analysis as per Baron & Kenny (1986).[8] We find evidence that low prevalence gambling forms may act as a mediator between high prevalence forms and PG, consistent with the "gateway" hypothesis. See Appendix section "Mediation Analysis – forms of gambling" for further details of this analysis.

Table 4: Marginal effects on PG of various forms of childhood gambling.

	PG Category			
	No evidence	Some evidence	Moderate evidence	PG
Slots	-0.028	0.013	0.009	0.006
	[-0.075,0.019]	[-0.008,0.034]	[-0.006,0.025]	[-0.004,0.016]
	-4%	*8%*	*11%*	*14%*
Scratch cards	0.012	-0.006	-0.004	-0.003
	[-0.043,0.068]	[-0.031,0.020]	[-0.022,0.014]	[-0.014,0.009]
	2%	*-3%*	*-5%*	*-6%*
Horses/Dogs	-0.002	0.001	0.001	0.000
	[-0.051,0.048]	[-0.022,0.023]	[-0.016,0.017]	[-0.010,0.011]

[8] This mediation analysis is exploratory and was not pre-registered, but was deemed appropriate to run to delve further into the findings from our pre-registered analysis.

	0%	*0%*	*1%*	*1%*
Friends	-0.088*** [-0.142,-0.033] *-12%*	0.040*** [0.015,0.064] *24%*	0.030*** [0.010,0.049] *39%*	0.018*** [0.006,0.030] *49%*
Bingo	-0.017 [-0.070,0.035] *-2%*	0.008 [-0.016,0.032] *5%*	0.006 [-0.012,0.024] *7%*	0.004 [-0.007,0.015] *9%*
Lottery	-0.049 [-0.115,0.016] *-7%*	0.022 [-0.007,0.051] *13%*	0.017 [-0.006,0.039] *21%*	0.01 [-0.004,0.024] *25%*
Sports Betting	-0.158*** [-0.235,-0.081] *-22%*	0.065*** [0.036,0.094] *39%*	0.057*** [0.026,0.087] *72%*	0.036*** [0.015,0.057] *97%*
Loot boxes	-0.110** [-0.210,-0.011] *-16%*	0.046** [0.009,0.084] *27%*	0.039** [0.002,0.076] *47%*	0.025* [-0.000,0.051] *61%*
Casino	-0.126** [-0.228,-0.025] *-18%*	0.052*** [0.015,0.089] *30%*	0.045** [0.006,0.084] *54%*	0.030** [0.002,0.058] *72%*
E-sports betting	-0.288*** [-0.481,-0.095] *-41%*	0.090*** [0.062,0.118] *52%*	0.110** [0.026,0.194] *131%*	0.088** [0.002,0.175] *215%*
Spread betting	-0.261** [-0.510,-0.011] *-37%*	0.086*** [0.042,0.129] *49%*	0.098* [-0.007,0.203] *116%*	0.077 [-0.028,0.182] *181%*
Other	0.235*** [0.145,0.325] *34%*	-0.129*** [-0.186,-0.072] *-74%*	-0.069*** [-0.094,-0.045] *-81%*	-0.037*** [-0.050,-0.024] *-83%*
N	1663	1663	1663	1663

Table shows average marginal effects obtained from generalised ordered logit/partial proportional odds regression analysis. Regression model includes as controls number of parents that gambled and parent attitudes towards gambling, as well as the controls listed in the Methods section. 95% confidence interval for each average marginal effect in square brackets. The average marginal effect as a percentage of the baseline probability (i.e. adjusted margin when the explanatory variable is set to zero) is shown in italics below each confidence interval. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

To gain further insight into the role of various forms of gambling on PG, we carried out additional exploratory analysis that had not been pre-registered. We looked at the link between PG and the number of different forms of gambling engaged in before 18. We find that engaging in more forms of gambling increases the risk of later life PG (Appendix Table A 2). We looked at the link with PG of having engaged in what could be categorised as "emerging" forms of gambling (e-sports betting, spread betting, loot boxes) as well as the link of PG with having engaged in more established forms (all other forms). Appendix Table A 3 shows that both forms are significantly associated with PG, but that the effect size is larger for emerging forms. We also looked at the link between having engaged in forms of gambling with a particularly high speed of play pre-18 (slots, casino gambling; Appendix Table A 4). We find that having played a fast form is significantly associated with an increased risk of having some evidence of PG, moderate evidence of PG, or PG. Having played another form is associated with an increased risk of some evidence and moderate evidence of PG, but not PG.

To analyse if the relationship between PG and childhood experiences is different for the under 40 age cohort compared to the 40 plus age cohort, we ran a pre-registered exploratory regression analysis where we interacted age cohort with the childhood experiences variables (Appendix Tables A 5 and A 6). There is no significant difference between cohorts in how PG relates to each of having gambled before 18, having a parent that gambled with high intensity, and parental attitudes. However, we see differences between cohorts in the effects of other parental gambling variables on PG. Having either one or two parents who gambled significantly increases the risk of PG for those 40 plus, but has no significant effect for the under 40s. Additionally, having a parent who gambled with low intensity is protective against PG for under 40s, but not for those aged 40 plus.

We also carried out a pre-registered analysis of the relationship between childhood experiences and gambling spend. We used a zero-inflated Poisson regression here. We find that gambling before 18 and more positive parental attitudes towards gambling both reduce the probability that a person never gambles (Appendix Tables A 7 and A 8). However, only gambling intensity is related to how much someone spends on gambling, given that they gamble. Having a parent who gambled with high intensity is associated with increased gambling spend, relative to those who gamble but whose parents did not.

Finally, in a pre-registered OLS analysis, we find that a person's attitudes towards gambling at least in part reflect their parents' attitude (Appendix Table A 9). Having parents who had a more positive attitude towards gambling is associated with a person themselves having a more positive gambling attitude.

Discussion

We find strong links between childhood experiences of gambling and PG in adulthood. Gambling before the age of 18 almost doubles the probability of having PG, after controlling for parental factors and a broad range of sociodemographic factors. We find a similar effect for having had a parent who gambled with high intensity during a person's childhood. More positive parental attitudes towards gambling also increase the probability of PG – a one standard deviation increase in the parental attitude measure raises the probability of PG by around a third.

Having one parent who gambled increases the probability of PG by about a third as well, relative to having no parent who gambled. This result is driven by those aged 40 or more. Having had two parents that gambled does not increase the probability of PG in the full sample, but does among the

40 plus age group. This weakening of the link between family-related factors and PG in the younger cohort may indicate changes to the sources of exposure to gambling among younger cohorts. Given the expansion of the gambling industry and growth of online gambling and advertising in particular, under 40s have been exposed to a much greater level of gambling accessibility and marketing during childhood than the 40 plus age group (Thomas et al., 2012). Additionally, this growth in online gambling may mean that the gambling of a parent was less salient for the under 40s than the over 40s, as online gambling is less visible than in-person forms. The upshot may be that while parental gambling behaviour was previously a primary predictor of adult PG, other factors have now become the main predictors.

The forms of underage gambling most strongly associated with PG are: gambling among friends, sports betting, casino gambling, e-sports betting, loot boxes and spread betting. We note that these are, for the most part, also the least popular forms of underage gambling. Additional exploratory analysis gives some support to these low prevalence forms of gambling being mediators for the relationship between high prevalence forms, such as slots and scratch cards, and PG. That is to say, the high prevalence forms might act as a gateway – some children progress from these gateway forms onto the more niche low prevalence forms, and are then more likely to have PG in adulthood. This would imply that both high and low prevalence forms of underage gambling may increase risk of later PG. Some caution is needed here, however, as the numbers engaging in low prevalence underage activities in our sample is quite small, particularly the very low prevalence forms (casino gambling, e-sports betting, loot boxes and spread betting). Establishing whether such a gateway effect exists therefore requires more research, preferably with a large youth sample and longitudinal data.

This study has several strengths that support its contribution to knowledge on the relationship between childhood experiences of gambling and adult PG. It is run with a large, nationally representative sample. It is deployed online and so overcomes some of the social desirability bias issues that arise with in-person or telephone surveys. The analysis employs the state-of-the-art in scientific best practice by being pre-registered and by employing a correction for multiple hypothesis testing. Pre-registration of studies and correcting for multiple hypothesis testing are two actions that have been strongly recommended in order to improve reproducibility in empirical social science (Shrout & Rodgers, 2018).

Limitations

This study also has some important limitations. Here we consider three. First, our findings imply an association between childhood experiences and PG, but cannot be definitively interpreted as causal. Unobserved factors could explain this relationship, for example by predicting propensity for both childhood gambling and later life PG. Having said that, our analyses control for standard sociodemographic background factors. Factors such as gender, age and educational attainment are hence not driving the relationships we find. Given the ethical challenges of conducting experimental research on childhood gambling, our findings would benefit from testing via longitudinal surveys. From a public health perspective, however, it may be too costly to wait for better data that is likely to take years to collect. Even if we cannot be sure that the effects are causal, the strong associations that we report between childhood experiences of gambling and PG in later life add weight to the case for stronger regulation.

Second, our childhood gambling experiences variables may be subject to some recall bias. This could be problematic if any resulting measurement error is correlated with PG category. To reduce

measurement error in these responses, survey questions were designed to be simple; they recorded merely whether the participant recalled engaging in specific forms of gambling, rather than requesting estimates of frequency or spend. As such, most of the childhood gambling experiences we recorded could be reasonably expected to be remembered accurately.

Third, many forms of regulation that seek to protect children focus on preventing exposure to advertising, given existing bans on most forms of gambling for children. Our analysis did not test the link between advertising exposure and PG, as recall of advertising seen in childhood is unlikely to be reliable in later life. However, given the high rate of underage gambling reported, with two-thirds of adults recalling some form of gambling before turning 18, the findings suggest that current regulations have not achieved their aim of preventing children from gambling. Moreover, the weakening association between familial exposure to gambling and later PG is consistent with an effect of increased extra-familial exposure. As such, the findings support increasing the stringency of regulations that seek to minimise this exposure.

Implications and Conclusion

Our study has implications for both research and policy. The findings add to the weight of evidence for a link between childhood experiences of gambling and PG in adulthood. This in turn supports regulatory measures to minimise the exposure of children to gambling in order to reduce their risk of developing PG. These may include bans on children gambling or even entering a gambling premises, website or app. Strict safeguards may be required on digital platforms to ensure rapid age-verification before any engagement with gambling activities. Assuming that advertising is at least to some degree effective, our findings also imply that the future level of PG may be reduced by minimising the exposure of children to gambling marketing, using measures such as a watershed ban on TV advertising, the prohibition of gambling advertisements that may be particularly attractive to children, and restrictions on sponsorship of events or clubs where children are involved. Where other evidence suggests that certain gambling products have a particular appeal to children, these would be reasonable targets for stronger regulation also. Additionally, measures that protect parents from PG may indirectly help to reduce the risk of their children developing PG, given the links we find between parental gambling and later-life PG. One needs to bear in mind, however, that the influence of parents on PG risk appears to be weakening in younger age cohorts. This suggests that a focus on regulations that reduce the extra-familial exposure of children to gambling, such as regulation on accessibility and marketing, may be taking on greater importance.

The growing importance of extra-familial factors also has implications for PG treatment. It may mean that the profile of those seeking treatment is changing, with more people with no family history of gambling or PG presenting for treatment. Given this, future research on the changing profiles of PG treatment patients is warranted.

Several countries, such as the UK and Italy, have introduced increased regulatory measures to protect children in the last few years. A next step in research on this topic is to evaluate the effectiveness of such measures. Evaluation studies are of crucial importance to inform the future introduction and modification of regulatory measures. Additionally, such studies can help to establish the causal nature of the relationships between factors such as gambling at a young age and later-life PG.

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Appendix

Additional tables

Table A 1: National representativeness of the sample on gender, age and education

	Sample	Census 2022	Difference
Gender			
Female	51.5%	51.1%	0.4ppt
Male	48.3%	48.9%	-0.5ppt
Age			
Under 40	35.1%	36.9%	-1.8ppt
40-59	38.6%	36.4%	2.2ppt
60+	26.3%	26.7%	-0.3ppt
Education			
High school or less	29.2%	43.9%	-14.8ppt
Tertiary qualification less than a degree	28.8%	28.6%	0.2ppt
Degree or higher	42.0%	27.5%	14.6ppt

Table A 2: Marginal effects for relationship between PG and number of forms of gambling engaged in pre-18

	PG Category			
	No evidence	Some evidence	Moderate evidence	PG

Number of forms of gambling engaged in pre-18	-0.046***	0.020***	0.016***	0.010***
	[-0.056,-0.036]	[0.016,0.025]	[0.012,0.020]	[0.007,0.013]
	-6%	*13%*	*23%*	*33%*
N	1663	1663	1663	1663

Table shows average marginal effects obtained from generalised ordered logit/partial proportional odds regression analysis. Regression model includes as controls number of parents that gambled, parent attitudes towards gambling, and the controls listed in the Methods section. 95% confidence interval for each average marginal effect in square brackets. The average marginal effect as a percentage of the baseline probability (i.e. adjusted margin when the number of forms of gambling is set to one) is shown in italics below each confidence interval. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A 3: Marginal effects for relationship between PG and having engaged in (1) established forms of gambling and (2) emerging forms, pre-18.

	PG category			
	No evidence	Some evidence	Moderate evidence	PG
Gambled u18 on emerging forms	-0.218***	0.077***	0.083***	0.058***
	[-0.311,-0.124]	[0.051,0.102]	[0.042,0.124]	[0.025,0.091]
	-31%	*45%*	*105%*	*152%*
Gambled u18 on established forms	-0.102***	0.049***	0.034***	0.020***
	[-0.148,-0.057]	[0.026,0.072]	[0.019,0.050]	[0.011,0.029]
	-13%	*35%*	*55%*	*69%*
	1663	1663	1663	1663

Table shows average marginal effects obtained from generalised ordered logit/partial proportional odds regression analysis. Regression model includes as controls number of parents that gambled, parent attitudes towards gambling, and the controls listed in the Methods section. 95% confidence interval for each odds ratio in square brackets. The average marginal effect as a percentage of the baseline probability (i.e. adjusted margin when the explanatory variable is set to zero) is shown in italics below each confidence interval. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A 4: Marginal effects for relationship between PG and having engaged in fast forms of gambling pre-18.

	PG category			
	No evidence	Some evidence	Moderate evidence	PG
Gambled u18 on a fast form	-0.067***	0.029***	0.023***	0.014***
	[-0.112,-0.022]	[0.009,0.049]	[0.007,0.039]	[0.004,0.025]
	-9%	*18%*	*30%*	*61%*
Gambled u18 on another form	-0.133***	0.075***	0.054***	0.004
	[-0.180,-0.086]	[0.038,0.112]	[0.028,0.079]	[-0.016,0.024]
	-17%	*58%*	*105%*	*10%*

Table shows average marginal effects obtained from generalised ordered logit/partial proportional odds regression analysis. Regression model includes as controls number of parents that gambled, parent attitudes towards gambling, and the controls listed in the Methods section. 95% confidence interval for each odds ratio in square brackets. The average marginal effect as a percentage of the baseline probability (i.e. adjusted margin when the explanatory variable is set to zero) is shown in italics below each confidence interval. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A 5: Odds ratios for analysis of interaction between age cohort and each of underage gambling, number of parents that gambled, and parental attitudes towards gambling

	PGSI category		
	At least some evidence *Odds ratio*	At least moderate evidence *Odds ratio*	PG *Odds ratio*
Being <u>under 40</u> interacted with childhood experiences			
Gambled u18	1.633*** [1.190,2.242]	1.633*** [1.190,2.242]	1.633*** [1.190,2.242]
Gambled u18 x Age u40	1.457 [0.872,2.434]	1.457 [0.872,2.434]	1.457 [0.872,2.434]
One parent gambled	1.690*** [1.218,2.345]	1.690*** [1.218,2.345]	1.690*** [1.218,2.345]
One parent gambled x Age u40	0.581** [0.348,0.969]	0.581** [0.348,0.969]	0.581** [0.348,0.969]
Two parents gambled	1.721** [1.004,2.949]	1.721** [1.004,2.949]	1.721** [1.004,2.949]
Two parents gambled x Age u40	0.361*** [0.169,0.771]	0.361*** [0.169,0.771]	0.361*** [0.169,0.771]
Parental attitudes	1.053 [0.904,1.227]	1.021 [0.848,1.230]	1.356** [1.047,1.757]
Parental attitudes x Age u40	1.227* [0.965,1.559]	1.227* [0.965,1.559]	1.227* [0.965,1.559]
Age u40	1.865*** [1.165,2.984]	1.865*** [1.165,2.984]	1.865*** [1.165,2.984]
Being <u>40 plus</u> interacted with childhood experiences			
Gambled u18	2.380*** [1.584,3.578]	2.380*** [1.584,3.578]	2.380*** [1.584,3.578]
Gambled u18 x Age 40 plus	0.686 [0.411,1.146]	0.686 [0.411,1.146]	0.686 [0.411,1.146]
One parent gambled	0.982 [0.662,1.457]	0.982 [0.662,1.457]	0.982 [0.662,1.457]
One parent gambled x Age 40 plus	1.721** [1.032,2.870]	1.721** [1.032,2.870]	1.721** [1.032,2.870]
Two parents gambled	0.621* [0.364,1.060]	0.621* [0.364,1.060]	0.621* [0.364,1.060]
Two parents gambled x Age 40 plus	2.770*** [1.296,5.919]	2.770*** [1.296,5.919]	2.770*** [1.296,5.919]
Parental attitudes	1.292***	1.253**	1.664***

	[1.070,1.559]	[1.019,1.540]	[1.271,2.177]
Parental attitudes x Age 40 plus	0.815*	0.815*	0.815*
	[0.641,1.036]	[0.641,1.036]	[0.641,1.036]
Age 40 plus	0.536***	0.536***	0.536***
	[0.335,0.858]	[0.335,0.858]	[0.335,0.858]
N	1663	1663	1663

Table shows odds ratios obtained from generalised ordered logit/partial proportional odds regression analyses. We present odds ratios rather than average marginal effects as the former are more appropriate for interaction effects. Panel 1 includes results from a regression with interactions between an indicator for being under 40 and childhood experiences. Panel 2 shows results from a regression with interactions between an indicator for being 40 plus and childhood experiences. Regression models include controls listed in the Methods section. 95% confidence interval for each odds ratio in square brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Where the odds ratios for a particular variable are the same in all three columns, this means that the variable satisfies the proportional odds assumption.

Table A 6: Odds ratios for analysis of interaction between age cohort and each of underage gambling, intensity of parent gambling, and parental attitudes towards gambling

	PGSI category		
	At least some evidence	At least moderate evidence	PG
	Odds ratio	*Odds ratio*	*Odds ratio*
Being <u>under 40</u> interacted with childhood experiences			
Gambled u18	1.679***	1.679***	1.679***
	[1.222,2.307]	[1.222,2.307]	[1.222,2.307]
Gambled u18 x Age u40	1.495	1.495	1.495
	[0.894,2.502]	[0.894,2.502]	[0.894,2.502]
Parent gambling - low	1.409*	1.409*	1.409*
	[0.984,2.020]	[0.984,2.020]	[0.984,2.020]
Parent gambling - low x Age u40	0.523**	0.266***	0.063***
	[0.299,0.916]	[0.126,0.559]	[0.008,0.475]
Parent gambling - high	2.307***	2.307***	2.307***
	[1.522,3.496]	[1.522,3.496]	[1.522,3.496]
Parent gambling - high x Age u40	0.604	0.604	0.604
	[0.317,1.150]	[0.317,1.150]	[0.317,1.150]
Parental attitudes	0.996	0.955	1.269*
	[0.847,1.172]	[0.788,1.158]	[0.978,1.646]
Parental attitudes x Age u40	1.183	1.183	1.183
	[0.917,1.526]	[0.917,1.526]	[0.917,1.526]
Age u40	1.788**	1.788**	1.788**
	[1.112,2.876]	[1.112,2.876]	[1.112,2.876]
Being <u>40 plus</u> interacted with childhood experiences			

Gambled u18	2.523*** [1.675,3.800]	2.523*** [1.675,3.800]	2.523*** [1.675,3.800]
Gambled u18 x Age 40 plus	0.669 [0.400,1.121]	0.669 [0.400,1.121]	0.669 [0.400,1.121]
Parent gambling - low	0.650** [0.428,0.988]	0.650** [0.428,0.988]	0.650** [0.428,0.988]
Parent gambling - low x Age 40 plus	2.171*** [1.250,3.770]	2.171*** [1.250,3.770]	2.171*** [1.250,3.770]
Parent gambling - high	1.405 [0.856,2.306]	1.405 [0.856,2.306]	1.405 [0.856,2.306]
Parent gambling - high x Age 40 plus	1.656 [0.868,3.158]	1.656 [0.868,3.158]	1.656 [0.868,3.158]
Parental attitudes	1.175 [0.963,1.434]	1.134 [0.913,1.409]	1.501*** [1.137,1.981]
Parental attitudes x Age 40 plus	0.847 [0.657,1.092]	0.847 [0.657,1.092]	0.847 [0.657,1.092]
Age 40 plus	0.554** [0.344,0.891]	0.554** [0.344,0.891]	0.554** [0.344,0.891]
N	1663	1663	1663

Table shows odds ratios obtained from generalised ordered logit/partial proportional odds regression analyses. We present odds rations rather than average marginal effects as the former are more appropriate for interaction effects. Panel 1 includes results from a regression with interactions between being an indicator for under 40 and childhood experiences. Panel 2 shows results from a regression with interactions between an indicator for being 40 plus and childhood experiences. Regression models include controls listed in the Methods section. 95% confidence interval for each odds ratio in square brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Where the odds ratios for a particular variable are the same in all three columns, this means that the variable satisfies the proportional odds assumption.

Table A 7: Marginal effects for relationships between gambling spend and each of underage gambling, number of parents who gambled, and parental attitudes towards gambling

	(1) Never gamble? Binary Logit Model	(2) If gamble, how much spend on gambling? Poisson Model
Gambled when under 18	-0.063*** [-0.105,-0.021]	7.101 [-5.073,19.275]
One parent gambled	-0.018 [-0.068,0.032]	4.779 [-5.558,15.115]
Two parents gambled	0.006 [-0.067,0.078]	-7.725 [-19.553,4.103]
Parental attitudes	-0.025** [-0.048,-0.001]	1.732 [-4.100,7.564]
N	1663	1663

Table shows results obtained from zero-inflated Poisson regression analysis. The first column shows the average marginal effects from the binary logit element of this analysis that models excess zeros. The second column shows the average marginal effects from the Poisson regression element of the model. Regression models include controls listed in the Methods section. 95% confidence interval for in square brackets. Robust standard errors used. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A 8: Marginal effects for relationships between gambling spend and each of underage gambling, intensity of parent gambling, and parental attitudes towards gambling

	(1) Never gamble? Binary Logit Model	(2) If gamble, how much spend on gambling? Poisson Model
Gambled when under 18	-0.062*** [-0.104,-0.020]	7.816 [-4.543,20.174]
Parent gambling - low	-0.023 [-0.076,0.030]	-8.770* [-18.988,1.447]
Parent gambling - high	0.008 [-0.056,0.072]	16.684** [1.909,31.458]
Parental attitudes	-0.028** [-0.052,-0.004]	-1.218 [-7.813,5.377]
N	1663	1663

Table shows results obtained from zero-inflated Poisson regression analysis. The first column shows the average marginal effects from the binary logit element of this analysis that models excess zeros. The second column shows the average marginal effects from the Poisson regression element of the model. Regression models include controls listed in the Methods section. 95% confidence interval for in square brackets. Robust standard errors used. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A 9: Results for relationship between a person's attitudes towards gambling and that of their parents

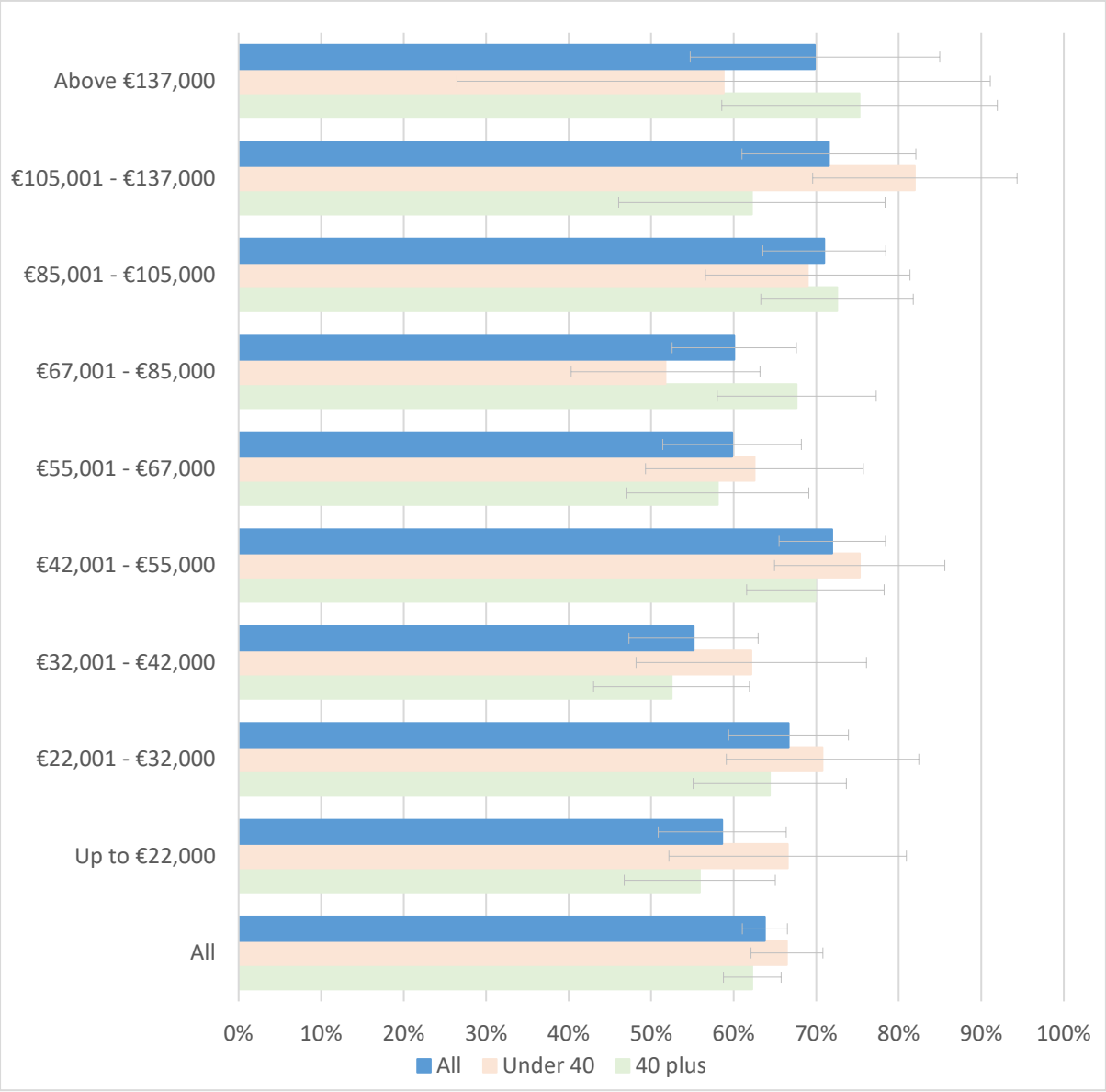
	(2) Own attitudes towards gambling

Parental attitudes	0.216***
	[0.164,0.269]
N	1663

Table shows results obtained from OLS regression analysis. Both the parental attitudes and own attitudes variables are standardised. Regression model includes controls listed in the Methods section. 95% confidence interval for in square brackets. Robust standard errors used. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

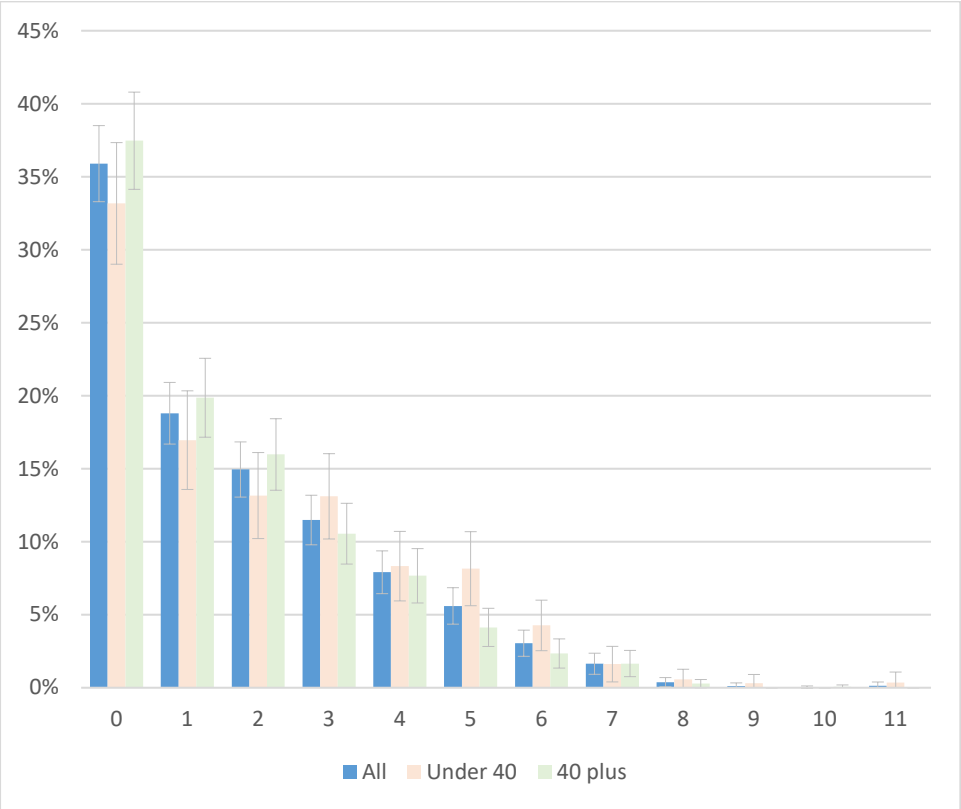
Additional figures

Figure A 1: Proportion of people who gambled before turning 18 – by income bracket



Notes: N=1,516 (income data is missing for 147 participants). 95% confidence intervals shown. Weighted estimates.

Figure A 2: Distribution of the sample by the number of forms of gambling they had engaged in before 18



Notes: N=1663. Note that the presentation of this descriptive chart was not pre-registered. Weighted estimates.

Mediation Analysis – forms of gambling

We generate two binary indicator variables. The first, "Gambled before 18 - high prevalence form", is equal to 1 if the participant engaged before 18 in any of the forms of gambling which were most prevalent in our sample: slots, scratch cards, lotteries, bingo, horse/dog betting, gambling among friends. The second indicator, "Gambled before 18 - low prevalence form", is equal to 1 if the participant engaged in any of the forms of gambling that were of lower prevalence in our sample: sports betting, spread betting, e-sports betting, loot boxes, casino gambling. We then carry out a four step mediation analysis as per Baron & Kenny (1986) to test if gambling on a low prevalence form is a mediator between gambling on a high prevalence form and PG category. Our results support this hypothesis (Table A10). We see that all of the criteria for a mediation relationship are met.

Step 1: gambling on a high prevalence form is a significant explanatory variable for PG category (column 1). This shows that there is a total effect of high prevalence forms on PG.

Step 2: Gambling on a high prevalence form is also a significant explanatory variable for gambling on a low prevalence form (column 2).

Step 3: Gambling on a low prevalence form is a significant explanatory variable for PG category when controlling for gambling on a high prevalence form (column 3). Step 2 and 3 combined show that there is an indirect effect of gambling on a high prevalence form on PG, via gambling on a low

prevalence form.
Step 4: Gambling on a high prevalence form is a significant explanatory variable for PG category, controlling for gambling on a low prevalence form (column 3). This shows that there is a direct effect of high prevalence forms on PG category.

Table A 10: Analysis of gambling before 18 on a low prevalence form as a mediator between gambling before 18 on a high prevalence form and PG category

	(1)	(2)	(3)
	PG category	Gamble before 18 – low prevalence form	PG category
	Ordered logit	Binary logit	Ordered logit
Gambled before 18 - high prevalence form	1.880***	15.554***	1.501***
	[1.464,2.415]	[8.400,28.801]	[1.157,1.947]
Gambled before 18 - low prevalence form			2.709***
			[2.042,3.593]

Table shows odds ratios obtained from generalised ordered logit/partial proportional odds regression analysis (columns 1 and 3) and binary logit regression analysis (column 2). The explanatory variables of interest in generalised ordered logit models satisfied the proportion odds assumption and so a single coefficient estimate is generated. Regression models includes as controls number of parents that gambled and parent attitudes towards gambling, as well as the controls listed in the Methods section. 95% confidence interval for each odds ratio in square brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Survey questions

Problem Gambling Severity Index

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?
2. 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?
10. To show you are not a bot, please choose “Sometimes” for this question.

Participants responded on a 4-point Likert Scale: Never, Sometimes, Most of the time, Almost always. Participants who failed the attention check in item 10 were not included in our final sample.

Gambling spend

Participants were first asked what forms of gambling they had engaged in over the previous four weeks:

In the last **four weeks**, have you **spent money** on any of the following forms of gambling?

Please do not include any form of gambling that you did not spend money on (e.g., playing card games with friends with no wagers)

a) Betting on horse or dog races. Y/N

b) Betting on other sports such as soccer, rugby, GAA, golf. Y/N

c) Lottery tickets. Y/N

d) Scratch cards or instant wins. Y/N

e) Bingo. Y/N

f) Fruit/slot machine style games online or in a physical location (e.g., an arcade, a casino). Y/N

g) Roulette, poker, cards or dice online or in a casino. Y/N

h) Spread betting (e.g., on shares or foreign currencies). Y/N

i) Bets or gambling between friends. Y/N

j) Any other form of gambling not described above. Y/N

For each form of gambling they selected, they were then asked if they had spent money on that form online or in-person.

Thinking about each of the activities below, **where** did you spend money on each activity in the last **four weeks**? For each activity, tick all that apply. Again, please only choose places you **spent money**.

a) Lottery tickets

   ☐ Online

   ☐ In person

b) Scratch cards or instant wins

   ☐ Online

   ☐ In person

   etc.

They were then asked how much they had spent on each online form they chose, and each in-person form they chose.

Q3. Thinking about each of the activities below, **how often**, on average, did you spend money on each activity in the last **four weeks**? If you're not sure give your best guess.

Lottery tickets

- Online
    - Less than €5 a week
    - €5-€9 a week
    - €10-€20 a week
    - €21-€50 a week
    - €51-€100 a week
    - €101-€200 a week
    - More than €200 a week

Scratch cards or instant wins

- In person
    - Less than €5 a week
    - €5-€9 a week
    - €10-€20 a week
    - €21-€50 a week
    - €51-€100 a week
    - €101-€200 a week
    - More than €200 a week

When a participant selected a category (e.g. €10-€20 a week) a slider appeared asking them to specify the exact amount.

Please specify the exact amount by clicking and dragging on the slider scale below.

Attitudes Towards Gambling Scale-8

Please state the extent to which you agree or disagree with each of the following statements:

1. People should have the right to gamble whenever they want
2. There are too many opportunities for gambling nowadays
3. Gambling should be discouraged
4. Most people who gamble do so sensibly
5. Gambling is dangerous for family life
6. On balance, gambling is good for society
7. Gambling livens up life
8. It would be better if gambling was banned altogether

Participants answered on 5-point rating scale: 1: Strongly disagree, 2, 3, 4, 5: Strongly agree

Gambling before 18

Which of these activities did you spend money on before the age of 18? Tick all that apply. Please do not include any form of gambling that you did not spend money on (e.g., playing card games with friends with no wagers). Adapted from (UK Gambling Commission, 2021)

- ☐ Betting on horse or dog races
- ☐ Betting on other sports such as soccer, rugby, GAA, golf
- ☐ Spread betting (e.g., on shares or foreign currencies)
- ☐ Lottery tickets
- ☐ Scratch cards or instant wins
- ☐ Bingo
- ☐ Fruit/slot machine style games online or in a physical location (e.g., an arcade, a casino)
- ☐ Roulette, poker, cards or dice online or in a casino
- ☐ Bets or gambling between friends
- ☐ Loot boxes in video games
- ☐ Esports betting (i.e. betting on competitive video game tournaments and matches.)
- ☐ Any other form of gambling not described above

Number of parents that gambled

How many of your parents/guardians gambled while you were growing up?

Dropdown options: 0, 1, 2, don't know, not applicable to me

Intensity of parent gambling

If they said that one parent gambled:

For your parent/guardian that gambled, how often did he/she gamble while you were growing up?

Seven-point rating scale: 1: Very rarely, 2, 3, 4, 5, 6, 7: Always

Did he/she gamble less or more than the average person while you were growing up, do you think?

Seven-point rating scale: 1: A lot less, 2, 3, 4, 5, 6, 7: A lot more

If they said that two parents gambled:

Think of your parent/guardian who gambled the most while you were growing up.

How often did he/she gamble while you were growing up?

Seven-point rating scale: 1: Very rarely, 2, 3, 4, 5, 6, 7: Always

Did he/she gamble less or more than the average person while you were growing up, do you think?

Seven-point rating scale: 1: A lot less, 2, 3, 4, 5, 6, 7: A lot more

Parent attitudes towards gambling

To what extent do you agree or disagree with the following statement:

While I was growing up, my parents/guardians approved of gambling.

Seven-point rating scale: 1: Strongly disagree, 2, 3, 4, 5, 6, 7: Strongly agree

Participants also had the option to tick a box "if you don't know or if this is not applicable to you"

Effects of inducements on sports gambling and decision-errors: An experimental study

Diarmaid Ó Ceallaigh[a*], Shane Timmons[a,b], Deirdre A. Robertson[a,b], Peter D. Lunn[a,c]

a) Economic and Social Research Institute, Whitaker Square, Sir John Rogerson's Quay, Dublin 2, Ireland
b) School of Psychology, Trinity College Dublin, College Green, Dublin 2, Ireland
c) Department of Economics, Trinity College Dublin, College Green, Dublin 2, Ireland
*Corresponding Author: Diarmaid Ó Ceallaigh diarmaid.oceallaigh@esri.ie
Phone: +353864007941
Other email addresses: shane.timmons@esri.ie, deirdre.robertson@esri.ie, pete.lunn@esri.ie

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Author's contribution

DÓC, ST, DR, PL designed the study and research materials. DÓC, ST, PL contributed to the analyses and interpretation. DÓC completed the first draft of the manuscript. DÓC, ST, PL refined and approved the submitted version of the manuscript.

DÓC, ST, PL had full access to all data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

Conflict of interest

The authors declare no conflict of interest

Ethics

The study received ethical approval from the institutional research ethics committee on 22 February 2024.

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Abstract

Background and aims

Inducements are a core component of gambling marketing. However, they have attracted increased attention from regulators due to their potential links to gambling harms. We deployed a randomised, pre-registered online experiment to test whether inducements cause specific changes to gambling behaviour.

Methods

622 males aged under 40 made incentive-compatible betting choices over Euro 2024 football matches. Participants were randomised to see bets with inducements or to a control group with no inducements. Some participants were also randomised to see inducement-linked bets where the expected value odds made them the worst available choice, i.e., a dominated option that was an objectively "bad bet" even accounting for the inducement.

Results

Inducements increased the amount spent on bets by over 10% and almost halved the number of people opting not to bet. Those with evidence of problem gambling were disproportionately affected. Inducements also led to decision errors, making bettors three times more likely to choose bad bets.

Discussion and Conclusions

Our findings add to growing evidence that inducements risk causing harm to consumers, with worse effects among those with evidence of problem gambling. We provide novel evidence that inducements push gamblers into making decision errors, opting for bad bets that heighten the risk of financial harm. Our findings support the regulation of inducements to reduce gambling harms.

Introduction

Gambling inducements – such as boosted odds, free bets and stake-back offers – are used by operators to entice and retain customers. Proponents argue that inducements are standard practice for attracting customers in consumer markets and are good for competition. From a public health perspective, however, inducements may lead more people to gamble and gamblers to bet more – and thus lose more – than they otherwise would. Vulnerable groups may be particularly susceptible, especially people with problem gambling. These concerns arise against a backdrop of rapid growth in gambling via digital platforms and evidence that problem gambling (PG) is far more prevalent than previously thought (Ó Ceallaigh et al., 2023; Reith et al., 2019; UK Gambling Commission, 2023; Wardle et al., 2021) .

We contribute to growing evidence on how inducements affect gambling behaviour, focusing on willingness to gamble and incorporating novel tests of whether inducements lure bettors into decision-making errors.

Relevant Literature

Inducements are a core component of gambling marketing (Newall et al., 2019). They are usually presented as sales promotions that temporarily improve the risk and/or potential return of a bet (Hing et al., 2015; Newall & Torrance, 2024). Inducements are particularly prevalent in sports betting and come in multiple forms, including refund/stake back offers, free bets, signup offers, and winnings paid on near misses (Hing et al., 2017; Torrance et al., 2021). Advertisement of inducements is widespread across digital and traditional media (Hing, Russell, et al., 2019; Newall et al., 2019; Russell et al., 2018; Torrance et al., 2021) with most gamblers regularly receiving offers (Hing, Russell, et al., 2019). An expanding body of evidence investigates the associated risk of consumer detriment, using incentivised experiments, industry data analysis and survey data.

We located three randomised experiments that employed incentive-compatible designs. These experiments show that cash inducements lead gamblers to place riskier bets (Rockloff et al., 2019), increase gambling, raise expectations of winning and decrease perceived control (Challet-Bouju et al., 2020). Free bets also increase gambling participation rates (Behavioural Insights Team, 2022).

Analysis of industry data is consistent with these findings. A longitudinal study of almost 15,000 customers of France's state gambling operators linked inducements to increased deposits, wagers and gambling frequency (Balem et al., 2022). Further, inducements were associated with increased risky behaviours, such as loss chasing, particularly among those with PG. Effects also persisted, albeit with diminishing intensity, in the week after an inducement was taken up.

Self-reported survey data and qualitative data from interview studies also indicate that inducements increase gambling participation and spend as well as risky behaviours, such as impulsive in-play betting (Browne et al., 2019; Hing et al., 2018; Hing, Russell, et al., 2019; Rawat et al., 2020; Russell et al., 2018; UK Gambling Commission, 2022). Other qualitative studies suggest that young men and those seeking treatment for problem gambling may be particularly susceptible (Hing et al., 2014, 2022; Thomas et al., 2012).

The risk of consumer detriment comes not only from undue behavioural influence but also from the potential for consumer miscomprehension of offers. Inducements typically come with terms and conditions that are complex, hard to locate and written in legalistic language (Hing et al., 2017; Lole et al., 2019, 2020; Newall et al., 2019; Torrance et al., 2021), making it hard to determine their true economic value (Hing, Browne, et al., 2019; Newall & Torrance, 2024). For example, free bet offers usually return only winnings, not the stake, and often include play-through requirements (i.e. further bets must be placed before winnings can be withdrawn).

Aims and Hypotheses

We build on existing research by deploying a randomised, pre-registered experiment to test whether inducements cause specific changes to gambling behaviour. Given the rise of online gambling, we ran the study online with incentive-compatible bets. We focused on men under 40, due to their propensity for PG and sports betting (Ó Ceallaigh et al., 2023). The study was run in the weeks before the 2024 UEFA European Football Championship ("Euro 2024"), with bets placed on matches in the first two rounds. Participants were randomised to see bets with inducements or to a control group with no inducements.

Our pre-registered hypotheses included that inducements would increase willingness to gamble (H1a), including when offered opportunities to bet subsequent to the inducement offer, and that the effect would be stronger among those with higher PGSI scores (i.e. more severe PG) (H1b). We also incorporated novel tests for whether inducements increase bettor's propensity to make errors. Identifying errors in decision-making requires objective benchmarks. Our experiment included some inducement-linked bets where the expected value odds made them the worst available choice, i.e., a dominated option that was an objectively "bad bet" even accounting for the inducement. We hypothesised that inducements increase errors in choices (H2a), defined as spending more on "bad bets", again with stronger effects among those with higher PGSI scores (H2b).

We pre-registered secondary analyses to investigate variation in gambling behaviour by participants' characteristics (mental health, educational attainment, gambling activity) and comprehension of the terms and conditions of offered inducements. Our hypotheses, experimental design and analysis plan were pre-registered on the Open Science Framework.

Method

The experiment was programmed and hosted on Gorilla Experiment builder (Anwyl-Irvine et al., 2020) and was mobile, tablet and laptop compatible. The study received ethical approval from the institutional research ethics committee on 22 February 2024.

Participants

1,121 men were recruited from online panels of two market research agencies during June 2024. We screened out those who: were over 40, reported current or historical treatment for problem gambling, did not want to view gambling-related materials and reported being "not interested at all" in Euro 2024 (totalling 327 exclusions). We also screened out participants who

failed a forced-response attention check (21 exclusions). A further 151 participants failed to complete the study in full. The final sample was 622 participants.

Participants were paid €3 for completing the experiment and were entered into a raffle for one of three €100 Mastercard e-vouchers.

Design and procedure

The experimental design and procedure are depicted in Figure 1.

Participants first completed questions about their interest in Euro 2024, which served two purposes: acting as a "decoy" to mask our primary interest in the betting choice tasks and to generate control variables.

Next, participants learned that they would use experiment money to place bets, with accumulated money converted into raffle tickets after the second round of Euro 2024. The exchange rate was simple, at the rate of 10 raffle tickets per €1, with three €100 Mastercard vouchers as prizes. Their total was calculated by adding unspent money and returns from winning bets based on the real matches. Linking the experiment money to raffle tickets for real prizes ensured that choices were incentive-compatible – the more money participants ended up with, the better their chances of winning €100.

Participants saw six betting choice tasks, shown sequentially on separate pages. For each task, participants saw the odds for a home win, draw and away win in two Euro 2024 group matches. They were given €10 in experiment money per task and could bet any portion of it on one of the six outcomes or choose not to bet. Clicking on an outcome displayed the potential returns, similar to online betting apps (see Figure 2).

Following these tasks, participants were asked about their gambling activity in the previous month and standard background characteristics. Finally, they completed the Problem Gambling Severity Index (PGSI: Ferris & Wynne, 2001) and Mental Health Inventory-5 (MHI-5: Berwick et al., 1991; Veit & Ware, 1983). They were also given the opportunity to cancel all bets made during the experiment.

Experimental manipulations

We experimentally manipulated inducements (Offer, No Offer) and betting odds (Market+, Low odds), giving a 2x2 between-groups design.

Offers

Participants in the Offer condition saw three inducements not shown to those in the No Offer condition. First, they were given a free €5 bet after task 1. This was included primarily to ensure participants would recognise subsequent inducements as real but also functioned as a treatment. This bet could only be placed on Serbia to beat Slovenia or England to beat Denmark. If they chose not to bet, they did not get to keep the €5. Second, a moneyback inducement appeared on task 3 (Figure 2, middle), allowing participants to bet on Georgia to beat Turkey with a refund if the game was drawn. Third, task 6 featured a conditional free bet: if participants bet on Hungary to beat Switzerland, they received a free bet (Figure 2, right). Standard terms and conditions were stated at the bottom of the advertisement (e.g., the free bet was worth half their stake on Hungary and could only be used to bet on Belgium to beat Romania or Croatia to beat Albania). Additional terms and conditions were contained in a pop-

up that could be revealed by clicking on a "T&Cs apply – click here" link at the bottom of the ad. These terms explained that, as standard, if the participant backed a winner with the free bet, they would get only winnings returned, not the stake.

After task 6, participants in the Offer conditions answered questions checking their recall and comprehension of the terms and conditions of the inducements.

Odds

We varied the length of the odds in tasks 3 and 6, which altered the *expected value* (EV; i.e., the average win or loss) per €1 staked. The EV is calculated as:

$$P(Win) * Potential\ winnings - (1 - P(Win)) * Potential\ loss$$

where *P(Win)* is the probability of a bet winning. For a €1 bet, the potential winnings is equal to the odds, and the potential loss is €1, so this simplifies to:

$$P(Win) * Odds - (1 - P(Win))$$

To calculate *P(Win)*, we follow Kuypers (2000). We first need to calculate the bookmaker's average profit margin on the match being bet on:

$$\left(\frac{1}{1 + Odds_{Home}} + \frac{1}{1 + Odds_{Draw}} + \frac{1}{1 + Odds_{Away}}\right) - 1$$

$Odds_{Home}$ are the odds on a home win, and so on. We can then calculate the implied probability of each outcome as:

$$\frac{1}{(1 + Bookmaker\ Profit\ Margin) * (1 + Odds\ on\ the\ relevant\ outcome)}$$

This gives us P(Win). For example, say Ireland is playing England, with odds of 13/2 for a home win, 31/10 for a draw and 4/9 for an away win. The bookmaker's profit margin is therefore 0.07, or 7%. The implied probability, or *P(Win)*, of Ireland winning is 0.12. The EV per euro staked on Ireland is then 0.12*(13/2) – (1.00-0.12) = -€0.07. This means bettors can expect to lose €0.07 for every €1 staked, which matches the bookmaker's profit margin.

In tasks 1, 2, 4 and 5, we set the odds at market rates for all participants, with EVs ranging from -€0.050 to -€0.067. In tasks 3 and 6, the odds (and therefore EVs) were manipulated to achieve two aims: to isolate the effect of inducements, since any offer will carry value, and to allow some bets to be classified as "bad" decisions, since they are the objectively worst choice in the set. The four experimental conditions were then:

Offer/Market+ Odds: The odds were at market rates, meaning bets without inducements had negative EVs. However, the bets with inducements (Georgia to win and Hungary to win) had positive EVs due to the inducements (Appendix, Table A1).

No Offer/Market+ Odds: The odds on Georgia and Hungary were set above market rates, matching the positive EVs in the Offer/Market+ condition. All other odds remained at market rates. This allowed us to isolate the effect of inducements, as the choice sets in both Market+ conditions had identical EVs.

Offer/Low Odds: The odds on Georgia and Hungary were reduced, making their EVs (with inducements) equal to the market-rate EVs without inducements. Other bets had increased EVs, making the bets with inducements the worst option, including not betting (i.e., they were "bad bets").

No Offer/Low Odds: The odds on Georgia and Hungary were also reduced to match their EV's in the Offer/Low Odds condition. Other bets in the same task had the same increased EVs, allowing for direct comparison to assess whether inducements influenced "bad bet" uptake, holding EV constant.

Statistical analysis

Table 1 presents the measures recorded, with more details in Appendix B. We analyse betting behaviour at the task level, with multiple observations per participant. We use a multilevel mixed effects regression to account for within-participant correlation between bets. A linear model is used to analyse bet amount and a logit model to analyse binary dependent variables. We use a Poisson version to analyse bad bets, as this dependent variable has a high proportion of zeros.

For participant-level binary variables (Moneyback T&Cs comprehension and Cancelled bets), we use a binary logit regression. For the Free bet T&Cs comprehension variable, we use a Poisson regression.

We report each regression twice: (i) with sociodemographic controls for age, education, employment; and (ii) with additional controls for relevant behavioural variables (PGSI score, MHI-5 score, past month sports/race betting frequency, past month other gambling frequency, intention to bet on Euro 2024, engagement with Euro 2024).

Results

Table 2 provides sample characteristics. Almost half of participants had bet on sport in the past month and most (81%) intended to bet on Euro 2024. The four experimental conditions were well-balanced across measured characteristics, with no significant differences.

Primary analysis

H1a: Inducements increase willingness to gamble

Figures 3, 4 and 5 present descriptive statistics. On task 1, the average amount bet was practically equivalent for the Offer and No Offer conditions (Figure 3). However, following the introduction of the first free bet immediately after task 1, participants in the Offer conditions bet more on every task than participants in the No Offer conditions. The distribution of amounts bet before the first free bet (task 1) is similar for both the No Offer and Offer conditions, but for subsequent bets the distributions diverge (Figure 4). Participants in the Offer conditions opted out of betting less often (Figure 5) and placed the maximum bet of €10 more often than those in the No Offer conditions.

Inducements significantly increased the amount bet on both offer tasks (tasks 3 and 6) and post-offer tasks (tasks 2, 4 and 5) (Table 3). Specifically, the inducements increased the amount bet on offer tasks by €0.75, on average, and on post-offer tasks by €0.60. Marginal effects show that, over tasks 2-6, participants exposed to inducements bet €3.31 more on average (€34.09 v €30.78), which equates to an 11% increase.

Inducements made participants 44% less likely to opt out of betting on an offer task, and 20% less likely on a post-offer task (Appendix, Table A2). The effect of inducements did not depend on the odds offered (Appendix, Table A3). Although both offers significantly increased the amount bet, the effect of the moneyback offer was stronger. While the free bet induced a €0.46 increase in the amount bet, on average, the moneyback offer induced a €1.05 increase (Appendix, Table A4).

H1b: The effect of inducements on willingness to gamble is stronger for those with higher PGSI scores

Figure 6 shows the mean amount bet on tasks 2 to 6 by participants in each PGSI category. The gap between the Offer and No Offer conditions increases at higher PGSI scores, peaking for the moderate evidence category, before declining slightly among those with PG. The differential remains larger for those with PG than those with some or no evidence of PG.

To account for this apparent non-linearity, we depart from our pre-registered analysis and interact the (post-)offer task variable with both PGSI score and PGSI score squared. The regression analysis confirms the inverse U-shaped relationship (Appendix, Table A5). The model estimates that inducements increased the amount bet per offer task for those with a PGSI score of zero by €0.63 (Figure 7), with the gap increasing and peaking at €1.50 for a PGSI score of 8.

H2a: Inducements increase errors in choices about what to gamble on

Participants in the Offer conditions spent four times more, on average, on the “bad bet” in task 3 and more than three times more in task 6, relative to the No Offer conditions (Figure 8). The proportion betting any amount on each bad bet was over three times higher in the Offer conditions (Figure 9). These differences are statistically significant (Table 4; Appendix, Table A6), with no significant difference between the two types of offers (Appendix, Table A7).

H2b: The effect of inducements on errors is stronger for those with higher PGSI scores

Descriptive analysis suggests a U-shaped relationship between PGSI and the effect of inducements on bad bets (Figure 10). However, tests for both a linear and non-linear relationship find no significant relationship (Appendix, Table A8).

Secondary analysis

The effects of inducements on both the amount bet overall and on bad bets were consistent across subgroups and other participant-level variables (e.g., gambling activity, mental health, educational attainment; Appendix, Tables A9 and A10).

Terms and Conditions

Understanding of terms and conditions was poor, despite participants' interest in gambling and Euro 2024 (Figure 11). A large proportion overestimated the value of the free bet (Figure 12). There was no significant association between comprehension and taking up the inducements (Appendix, Table A11), or between T&C comprehension and PGSI score (Appendix, Table A12). We intended to analyse the propensity to click to reveal the hidden T&Cs, but just two participants clicked on the hyperlink to read these details making this analysis infeasible.

Finally, inducements had no effect on the likelihood of cancelling bets at the end of the experiment (25% of participants did so) (Table A13).

Discussion

Our aim was to test whether inducements cause changes in gambling behaviour. Using incentive-compatible bets in a relevant context (sports betting on Euro 2024), inducements increased spending by bettors, supporting H1a, and decreased the likelihood of a consumer opting not to bet, consistent with previous studies (e.g., Challet-Bouju et al., 2020). Our effect sizes are large. Inducements increased spending by over 10% and almost halved the number of people opting not to bet. These findings are consistent with industry data showing that the effect of inducements persists even when no offer is present (Balem et al., 2022).

Inducements had stronger effects on those with higher PGSI scores, supporting H1b. However, this relationship followed an inverse U-shape, with the effect weakening for those with the most severe PG. Recall that those who had sought treatment for PG were excluded from the study, so the representativeness of the sample at high PGSI scores may be a factor. Also, the plateau and slight decline could partly reflect ceiling effects for those with severe PG, since bets were capped at €10. Overall, therefore, we interpret the relationship as implying that the inducements had a stronger effect on individuals with higher PGSI scores, but with uncertain effects at very high scores.

Whereas previous literature shows that inducements increase risk-taking, riskier bets are not necessarily errors (e.g., Rockloff et al., 2019). Our study design, by contrast, allowed us to identify objective errors. Supporting H2a, when an inducement was tied to a "bad bet" – that offered worse expected value than other options, participants were three times more likely to choose that bet and they bet larger amounts, compared to when an equivalent "bad bet" had no inducement. The effect was consistent across levels of PG (contra H2b). This finding constitutes novel evidence about the impact of inducements on gambling behaviour. Inducements led consumers to purchase bad value gambling products.

Despite most of the sample being regular bettors, understanding of the terms and conditions of inducements was poor. Most participants answered each comprehension question incorrectly, despite passing in-study attention checks and incentives to answer correctly. Notably, those

who took up offers mistakenly thought that terms and conditions were more favourable than they were.

Limitations

The study's limitations present opportunities for future research. First, we focused on sports betting among males under 40, the demographic most affected by PG. Our results may not generalise to other demographics or other forms of gambling. We also excluded those with a history of PG treatment and those uncomfortable with viewing gambling materials. Given widespread advertisement of inducements to gamble, these groups are likely exposed to such content in daily life and our results may not generalise to them.

Second, we captured only short-term effects of inducements. We observed persistence of effects over the course of a 15-minute study. Inducements, perhaps sign-up bonuses in particular, may have longer-term effects (Balem et al., 2022).

Third, we tested only free bets and moneyback offers tied to straightforward matchwinner bets. Many inducements in the market are tied to more complex multi-outcome bets. Our effects with respect to decision errors and miscomprehension might underestimate the potential impact on bets of this sort (Newall, 2015; Newall et al., 2019).

Lastly, although bets in the experiment were incentive-compatible, due to ethical considerations, participants used endowed credit in experiment money, rather than their own money. This may have influenced behaviour, including via weaker incentives to bet carefully or a potential "house money effect" (Clark, 2002). However, choices made by control group participants provide reassurance about engagement in the tasks and the realism of behaviour. Between 9 and 20% of the control group opted out of betting on each task and the large majority (over 90%) avoided the "bad bets" This provides confidence that the psychological mechanisms influenced by the inducements in our study are likely to be those involved in trying to place advantageous bets in real-world markets. That said, ideal evidence for the effects of inducements would come from randomised field trials of bettor behaviour, although such studies raise ethical challenges and require industry collaboration.

Implications and Conclusion

Our findings add to growing evidence that inducements lead more people to gamble and gamblers to spend more, increasing financial losses for consumers and raising profits for operators. We also find that inducements disproportionately affect those with evidence of PG. We provide novel evidence that inducements push gamblers into making decision errors, opting for bad bets that heighten the risk of financial harm.

Inducements to gamble are not merely a marketing tool that operates like equivalent inducements in other consumer markets. The argument that inducements simply help consumers differentiate between operators does not apply; they do more than this. We provide clear evidence for consumer detriment, particularly among vulnerable groups. This supports arguments for stricter regulation of inducements. Inducements also lead to decision errors, exposing consumers to "behavioural exploitation" (i.e., manipulation of consumer biases and inattention to extract profit; Bhargava & Loewenstein, 2015), further justifying regulation.

Widespread misunderstanding of terms and conditions even among regular bettors underscores these risks.

Multiple European countries have begun to regulate inducements (Stark & McKnight, 2024). Denmark, for example, requires bonuses to be valid for 60 days, offered to at least 100 people, and prohibits targeting inactive account holders. Spain prohibits sign-up bonuses, caps bonuses at €100 and restricts them for those with problem gambling. In the Netherlands, people cannot be offered bonuses while gambling. Belgium has banned all inducements (Commission des Jeux de Hasard, 2024). Our evidence provides additional rationales for such regulations. An important step for future research will be to evaluate the impacts of these restrictions, particularly on gambling harms.

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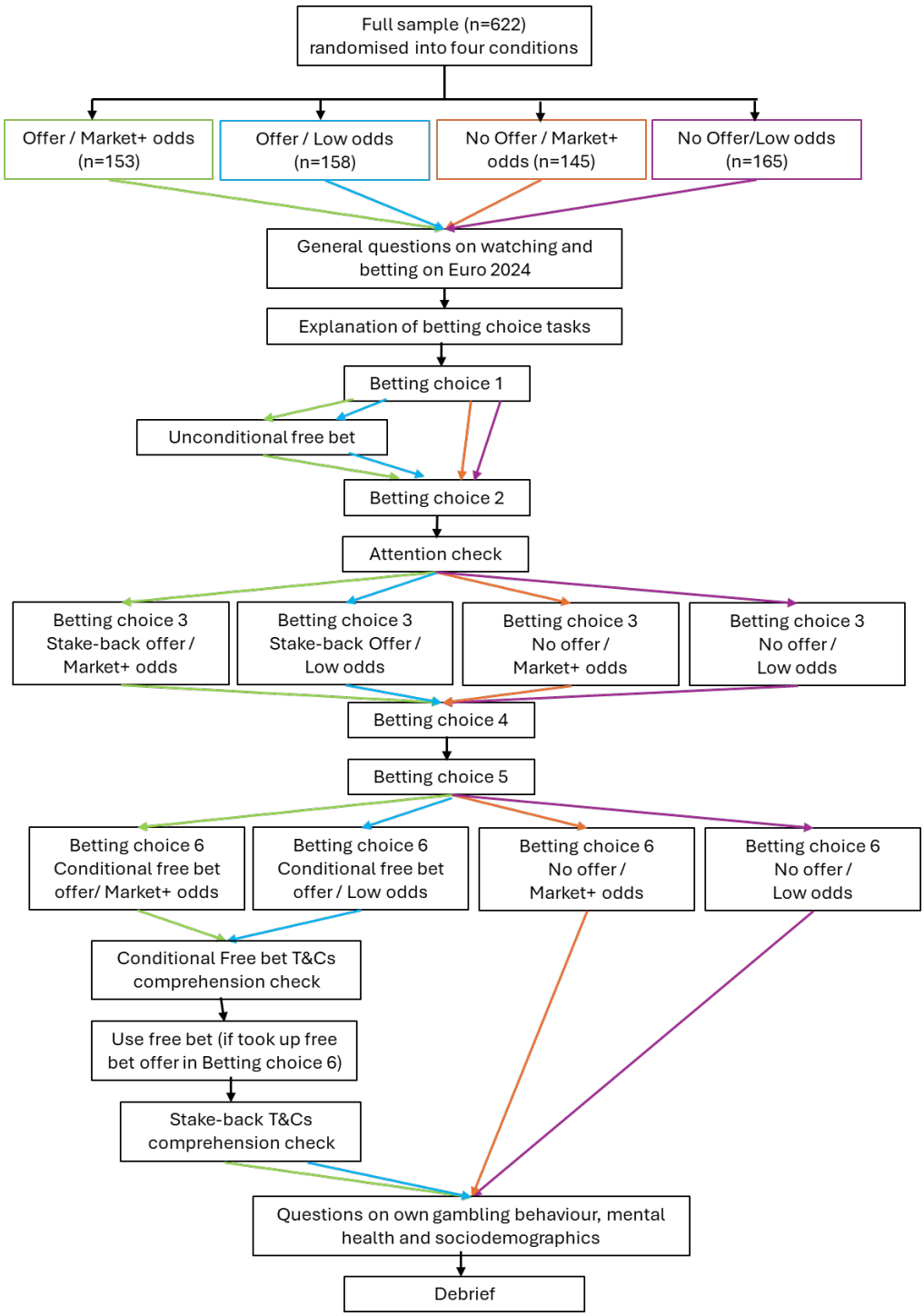
Figures



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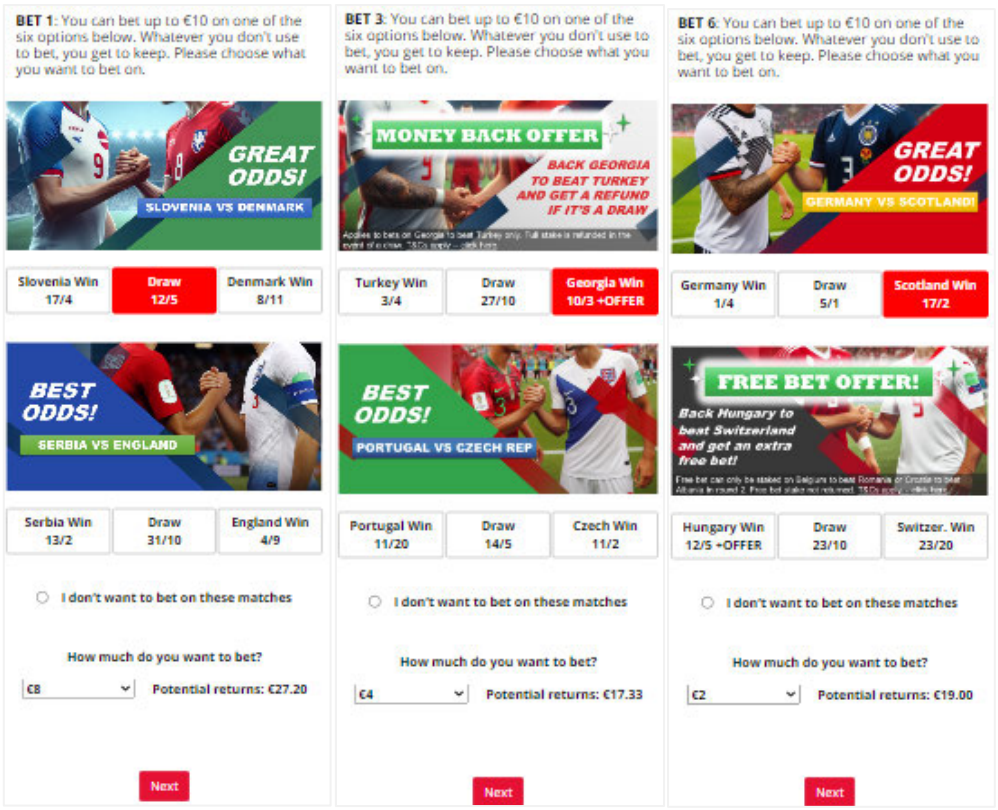

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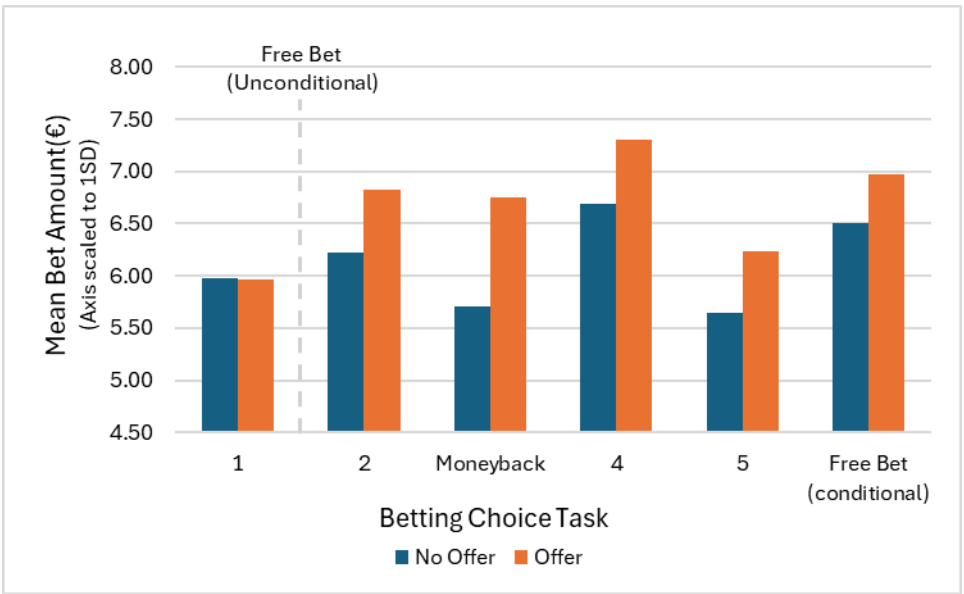

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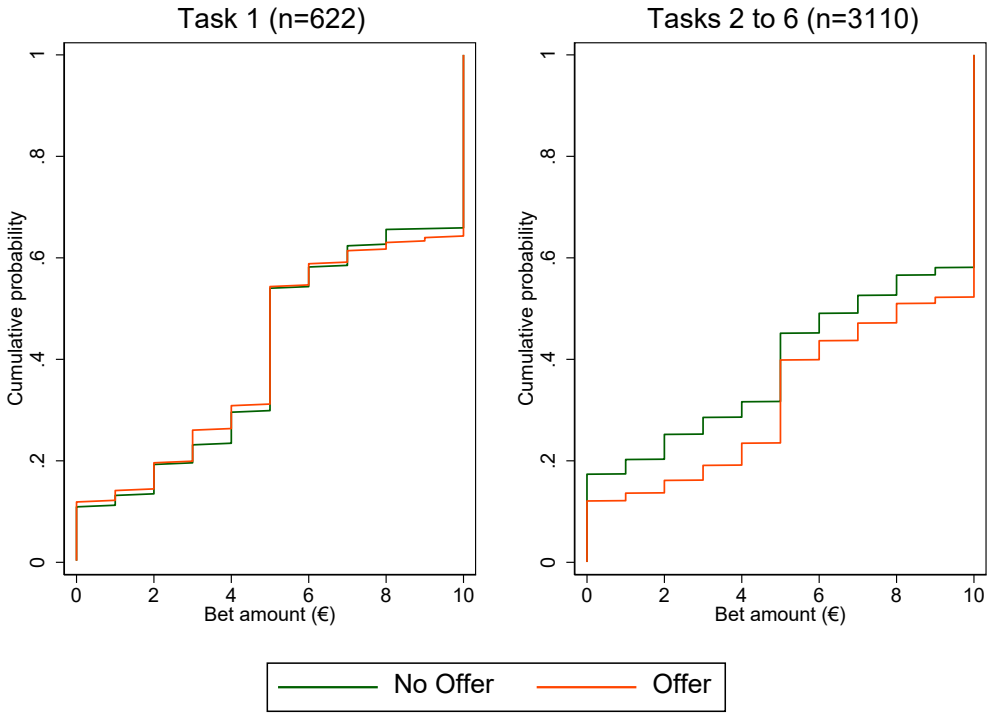

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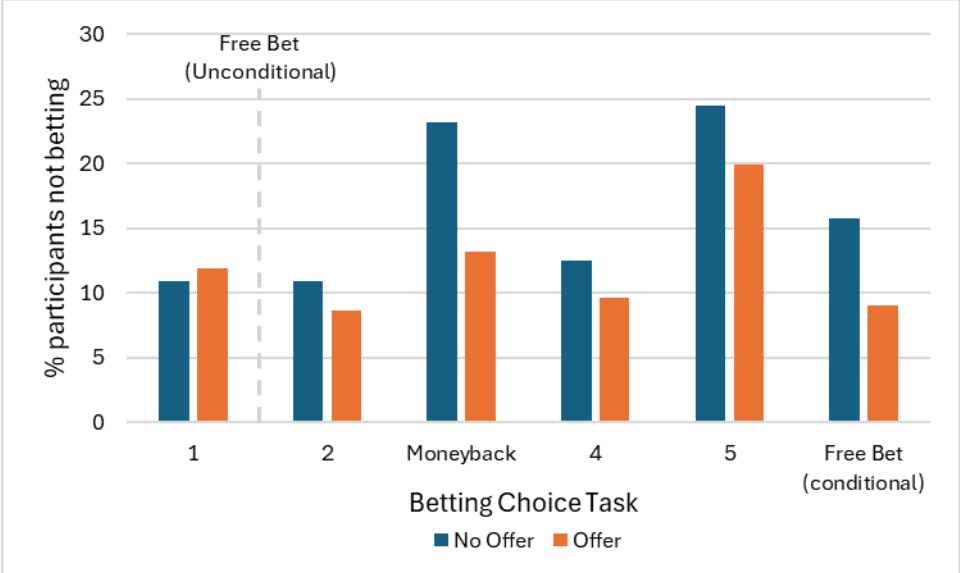

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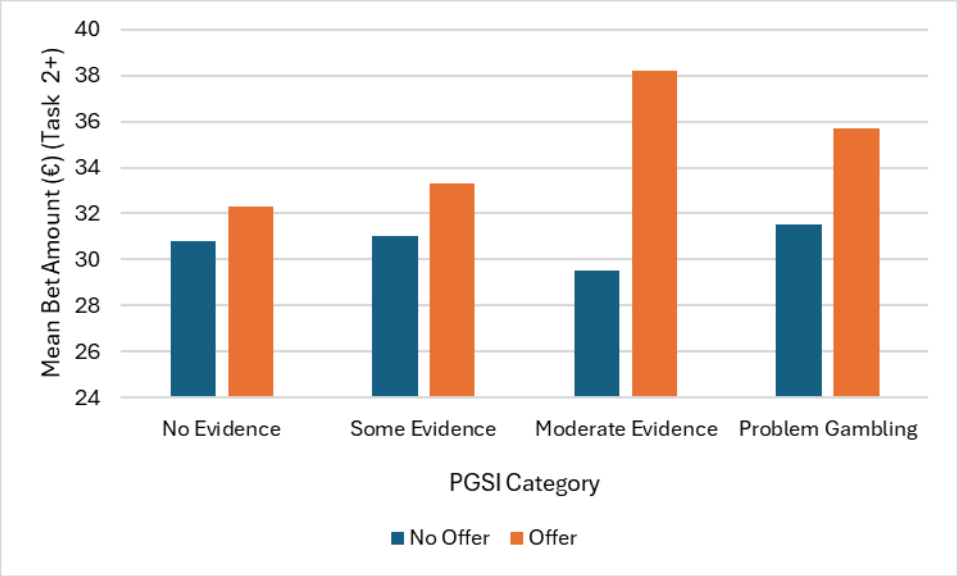

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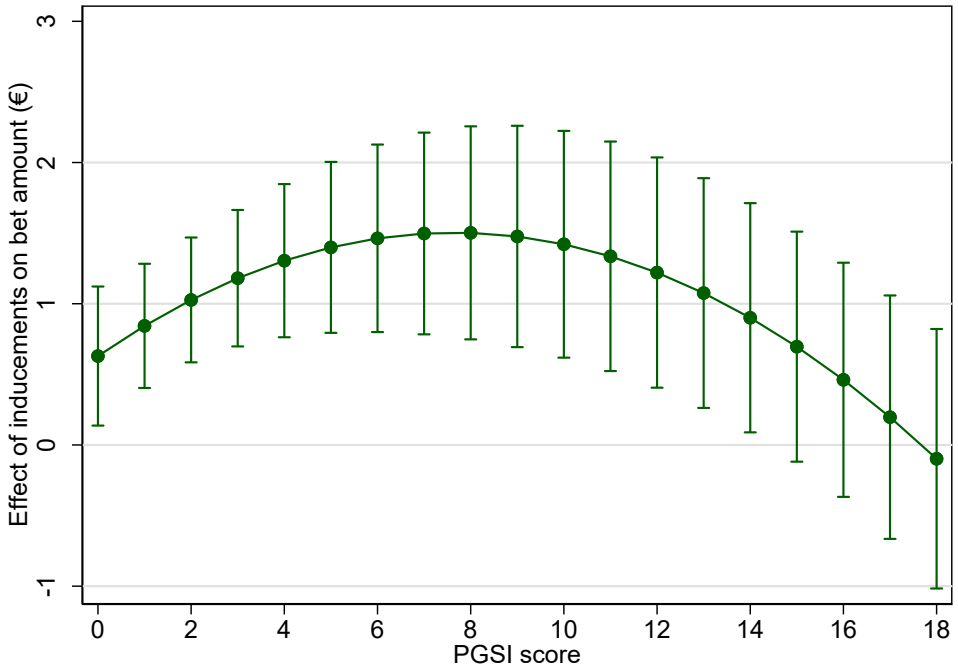

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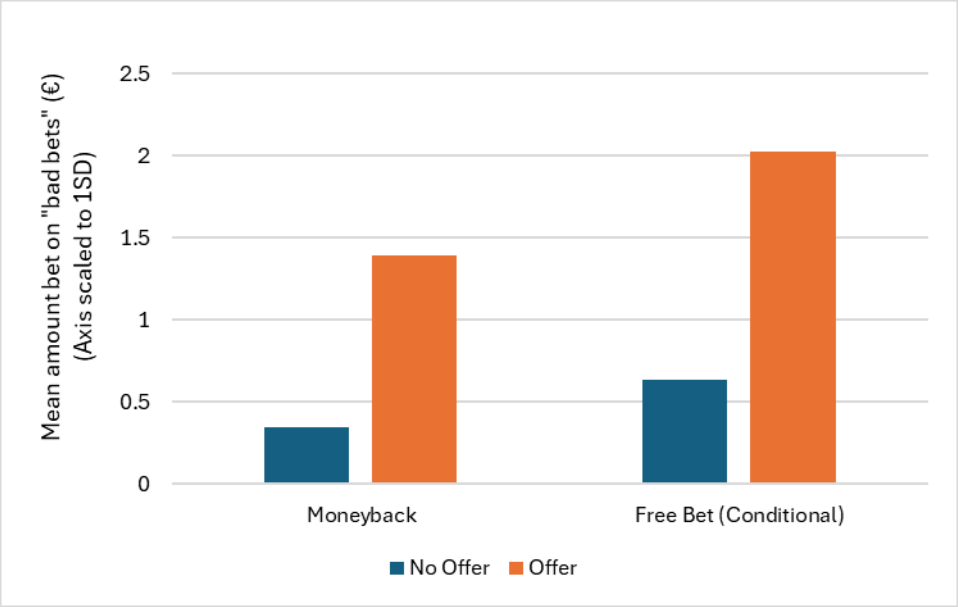
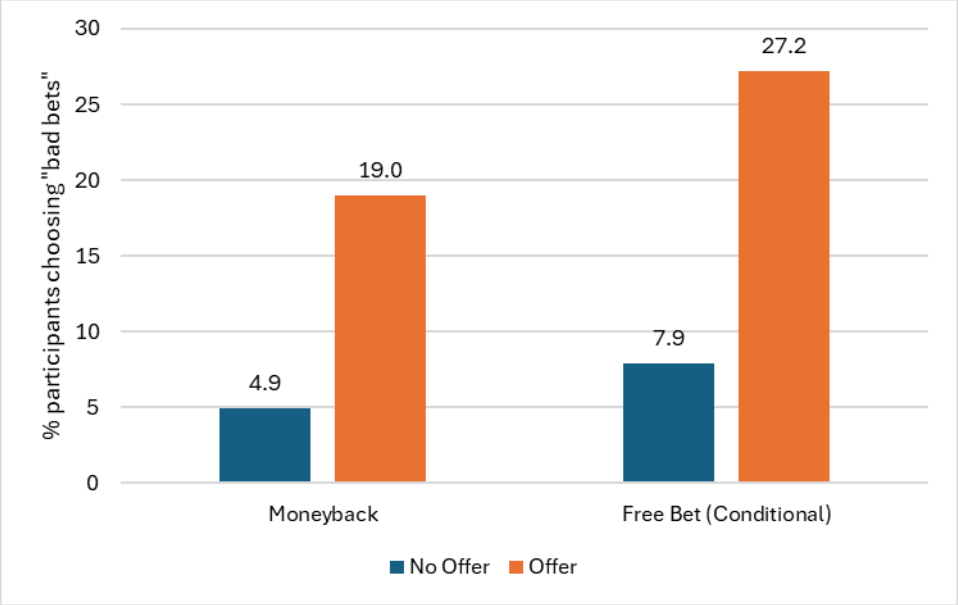


Figure 8: Mean amount bet on bad bets



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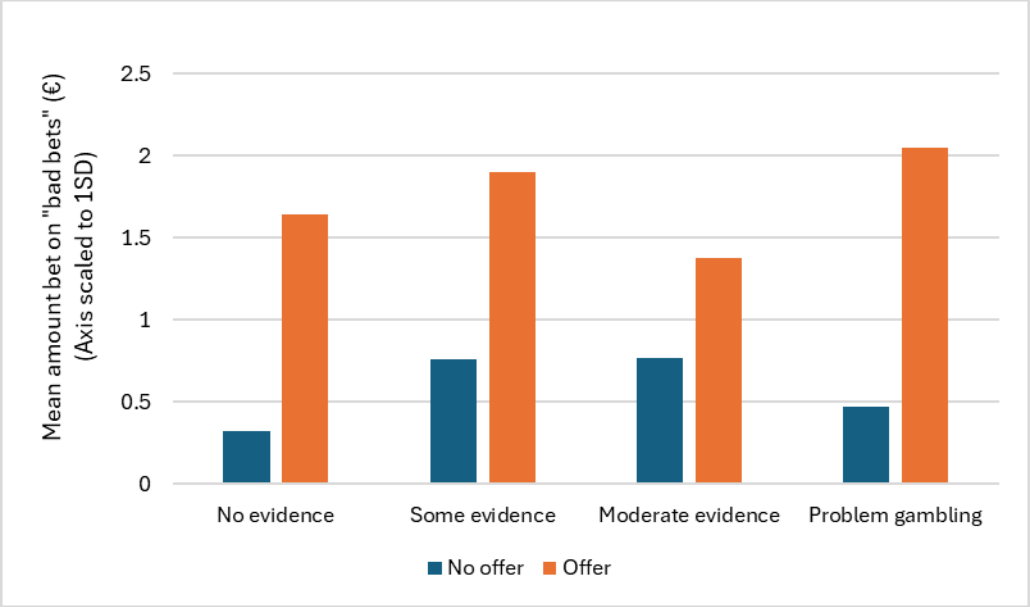

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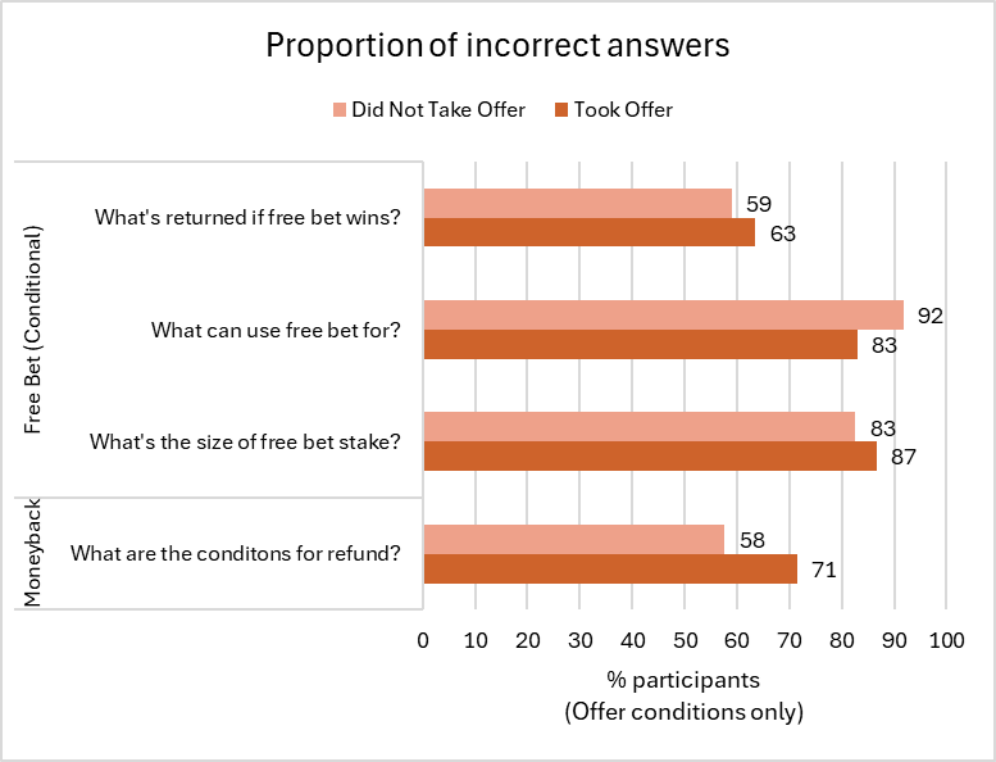

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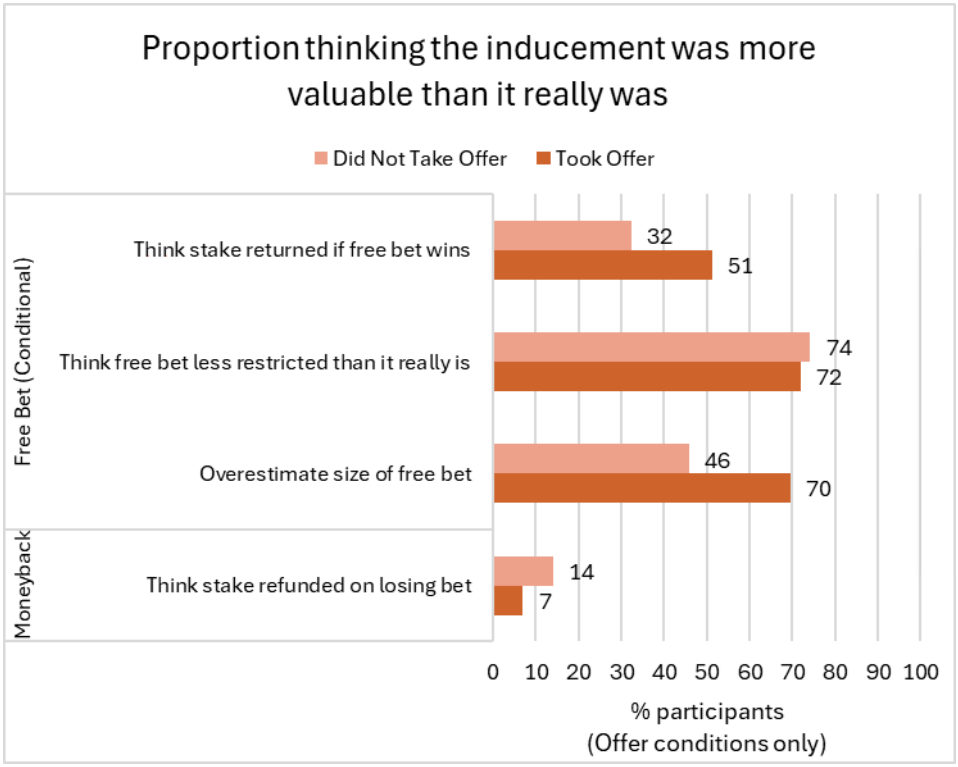

Figure 12: Proportion of participants who incorrectly thought the T&Cs were more favourable to the bettor

Tables

Table 1: Variables measured

Type	Measure	Description
Task-level dependent variables	Amount bet	Amount the participant bet on a given task – 6 observations per participant.
	Amount bet on "bad bets"	Amount participants in the Low Odds conditions bet on "bad bets" (i.e., Georgia on task 3 and Hungary on task 6) – two observations per participant.
Participant-level dependent Variables	Comprehension of Moneyback T&Cs	A binary indicator for having selected a correct response on an MCQ about the T&Cs of the moneyback offer.
	Comprehension of Free bet T&Cs	Number of correct answers given to three MCQs about the T&Cs of the free bet offer.
	Cancelled bets	A binary indicator for having chosen, at the end of the experiment, to cancel all bets made.
Other task-level Variables	Offer task dummy	A binary indicator for tasks that featured inducements (i.e., tasks 3 and 6 for participants in the Offer conditions).
	Post-offer task dummy	A binary indicator for tasks that did not have an inducement but came after one with an inducement (i.e., tasks 2, 4 and 5 for Offer condition participants).
	Low odds task dummy	A binary indicator for tasks with below market odds (i.e., tasks 3 and 6 for participants in the Low Odds condition).
	Task order dummies	Six binary indicators, one for each of tasks 1-6.
Other participant-level variables	PGSI score	Total score on the PGSI (ranging from 0 to 27 with higher scores indicating more severe problem gambling).
	Mental health score	Average score on the MHI-5 (ranging from 1 to 6 with higher scores indicating better mental health).
	Related behavioural measures	Past month sports/race betting frequency, past month other gambling frequency, having an online gambling account, intention to bet on Euro 2024, and engagement with Euro 2024 (more details in Appendix B).
	Socio-demographics	Age, employment status, and education.

Table 2: Sample characteristics

	Full sample	Offer/ Market+	No Offer/ Market+	Offer/ Low	No Offer/ Low
Age (mean)	30.5	31.1	30.3	30.3	30.4
Have a degree	68%	66%	66%	70%	70%
Employed	87%	87%	86%	89%	87%
PGSI score (mean, 27-point scale)	3.4	3.1	3.4	3.0	3.8
PGSI category:					
- Problem Gambling	15%	13%	14%	13%	20%
- Moderate evidence	17%	17%	19%	20%	10%
- Some evidence	22%	21%	18%	27%	21%
- No evidence	46%	49%	48%	41%	48%
Mental Health Score (mean, 6-point scale)	4.31	4.28	4.39	4.28	4.28
Placed a bet in the past month					
- Race betting	31%	28%	32%	34%	31%
- Sports betting	46%	42%	48%	47%	45%
- Race or sports betting	56%	53%	60%	56%	56%
Intended to bet on Euro 24	81%	80%	79%	84%	82%
Interest in Euro 24 (mean, 1-7 scale)	5.74	5.63	5.60	5.95	5.78
N	622	153	146	158	165

Table 3: Effects of inducements on amount bet

	(1)	(2)
Offer Task	0.753***	0.754***
	(0.220)	(0.217)
Post-Offer Task	0.602***	0.603***
	(0.199)	(0.197)
N	3732	3732
Task order controls	✓	✓
Sociodemographic controls	✓	✓
Behavioural controls		✓

Notes: Results from linear multilevel mixed effects regression. Amount Bet is the dependent variable, and is regressed on the Offer task dummy, Post-Offer Task dummy, and control variables. Standard errors in parentheses – clustered at the participant level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Asterisks determined using one-sided p-values for outcomes for which we pre-registered a directional hypothesis.

Table 4: Effects of inducements on amount bet on "bad bets"

	(1)	(2)
Offer Task	0.118***	0.121***
	(0.024)	(0.025)
	236%	*247%*
N	646	646
Experiment controls	✓	✓
Sociodemographic controls	✓	✓
Behavioural controls		✓

Notes: Results from Poisson multilevel mixed effects regression. Average marginal effects shown. The dependent variable, Amount bet on “bad bets”, is regressed on the Offer task dummy and control variables. The “experiment controls” are an indicator for task 6 and a variable for amount bet on task 1. Standard errors in parentheses – clustered at the participant level. Average marginal effect as a percentage of the predicted margin of not betting for the offer condition shown in italics. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Asterisks determined using one-sided p-values for outcomes for which we pre-registered a hypothesised direction of the effect.

[redacted]

From: [redacted]@gamblingcommission.gov.uk>
Sent: Monday, April 7, 2025 4:23 PM
To: [redacted]@gamblingcommission.gov.uk>
Subject: FW: Papers from Ireland

[redacted]

From: [redacted]@gamblingcommission.gov.uk>
Sent: Monday, April 7, 2025 1:36 PM
To: [redacted]@gamblingcommission.gov.uk>
Cc: [redacted]@gamblingcommission.gov.uk>
Subject: RE: Papers from Ireland

Hi [redacted], I'm still reading and reviewing – they're all really interesting and relevant, but (at first glance) if you only have time to read one in full then I'd probably prioritise this one: "Measures of PG, gambling behaviours and perceptions of gambling in Ireland" (attached) - seems really relevant to our work on developing the GSGB.
Also, the paper about effects of inducements on sports gambling and decision errors could be relevant to consumer voice work (particularly the Wimbledon project?).

I'll send summaries later today.

Thanks!
[redacted]

From: [redacted]@gamblingcommission.gov.uk>
Sent: Monday, April 7, 2025 11:26 AM
To: [redacted]@gamblingcommission.gov.uk>
Subject: RE: Papers from Ireland

Thank you!

[redacted]

From: [redacted]@gamblingcommission.gov.uk>
Sent: Monday, April 7, 2025 11:24 AM
To: [redacted]@gamblingcommission.gov.uk>
Subject: RE: Papers from Ireland

Hi [redacted] sure – I've blocked out a couple of hours today to read these and so will send you an overview asap

Thanks,
[redacted]

From: [redacted]@gamblingcommission.gov.uk>
Sent: Monday, April 7, 2025 11:09 AM
To: [redacted]@gamblingcommission.gov.uk>
Subject: FW: Papers from Ireland

Hi [redacted]

[redacted] and I are meeting with [redacted] tomorrow – would you have time today to have a quick read through the papers he sent over and provide a brief summary / let me know if I need to read any of them in full?

Thanks,

[redacted]

[redacted]

From: [redacted]@esri.ie>
Sent: Monday, February 10, 2025 5:14 PM
To: [redacted]@gamblingcommission.gov.uk>; [redacted]
[redacted]@gamblingcommission.gov.uk>
Subject: Papers from Ireland

CAUTION: This email is from an external source - be careful of attachments and links

Hi [redacted] and [redacted]

Really good to talk to you earlier. Attached are: (i) Our lit review for policymakers (ii) Our report with measures of problem gambling in Ireland (iii) Our working paper on the link between childhood gambling and problem gambling, and (iv) Our submitted paper on inducements.

Please note that the last of these is NOT in the public domain in any way at present, as the GRAI were keen for it not to be posted until it had completed peer-review. This draft is the paper we have submitted to an academic journal.

Hope these are useful.

[redacted]

[redacted]
Behavioural Research Unit, ESRI
Adjunct Professor, Department of Economics, Trinity College Dublin
www.esri.ie/bru

PROBLEM GAMBLING: A NARRATIVE REVIEW OF IMPORTANT POLICY-RELEVANT ISSUES

Diarmaid Ó Ceallaigh

Shane Timmons

Deirdre Robertson

Pete Lunn

June 2023

SURVEY AND STATISTICAL REPORT SERIES

NUMBER 119

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THE AUTHORS

Pete Lunn is a Research Professor at the Economic and Social Research Institute (ESRI) and Adjunct Professor of Economics at Trinity College Dublin (TCD). Deirdre Robertson and Shane Timmons are both Senior Research Officers at the ESRI and Adjunct Professors of Psychology at TCD. Diarmaid Ó Ceallaigh is a Postdoctoral Research Fellow at the ESRI.

ACKNOWLEDGEMENTS

This research forms part of a programme of research on gambling, which is funded by the Gambling Regulatory Authority of Ireland (GRAI). We would like to thank Anne Marie Caulfield and Ciaran O'Brien (GRAI), Ciara Reynolds (Institute of Public Health), Anne Marie Carew and Suzi Lyons (Health Research Board) for helpful comments on the review.

TABLE OF CONTENTS

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]

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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 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 (Condron 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 (Condron 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 in 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(Arg,Cro) = P(Arg) x P(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(Arg, Messi) = P(Arg|Messi) x P(Messi), where P(Arg|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(Arg|Messi) > P(Arg), and so P(Arg, Messi) > P(Messi) x P(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(Arg|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 (Cowlishaw 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 (Cowlishaw 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 (Condron et al., 2022). However, there is a need to strengthen links between inpatient and outpatient services (Condron 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 (Condron 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)*

'Funding – The study upon which this review is based was funded by GambleAware, a national charity instructed by government to commission research into gambling in Great Britain. GambleAware is funded through contributions from the gambling industry, but decisions about what research to fund are made by the Responsible Gambling Strategy Board (RGSB), an independent group that provides advice on gambling policy and research to government. In September 2016, the RGSB and GambleAware published a Research Commissioning and Governance Procedure (www.rgsb.org.uk/PDF/Research-commissioning-and-governance-procedure-September-2016.pdf) which describes how research priorities are set and commissioned, in isolation from the gambling industry.'

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 ___X___ Not counted

Question 2 ___X___ Not counted

Question 3 ___X___ 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 ___X___ 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 ___X___ Not counted

Question 16 k ___X___ 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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Short communication

A qualitative analysis of people who died by suicide and had gambling documented in their coronial file

Ciara ME Reynolds [a,*], Gemma Cox [b], Suzi Lyons [c], Helen McAvoy [a], Louise O'Connor [a], Katerina Kavalidou [b,d]

[a] Policy Team, Institute of Public Health, 700 South Circular Road, Saint James, Dublin, Ireland
[b] HSE National Office for Suicide Prevention, Stewarts Hospital, Palmerstown, Dublin 20, Ireland
[c] Health Research Board, Gratton House, 67-72 Lower Mount Street, Dublin, Ireland
[d] National Suicide Research Foundation, University College Cork, Ireland

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ABSTRACT

Background: Gambling related harms are vast and varied. There is evidence that gambling is associated with increased risk of suicidal ideation and attempts. Our aim was to identify and profile individuals who died by suicide and had gambling documented in their coronial file.

Methodology: The Irish Probable Suicide Death Study dataset contains all (n = 3,625) coroner and research-determined suicide deaths between 2015 and 2020. It was systematically searched to identify all deaths where gambling was recorded in coroner's files. Relevant data were extracted and included in a new database for further qualitative-driven analysis. Long-term distal (or chronic) and short-term proximal (or acute) risk factors were used as a framework for the analysis of the data.

Results: Gambling was recorded in 23 coroners' files, representing 0.6% of all suicides during the six-year period. Males were overrepresented and less than half were in employment at the time of death. Distal risk factors included co-occurring mental health conditions (notably mood disorders), a history of drug and alcohol dependency, past suicide intent and/or behaviour, and exposure to suicide. Key proximal risk factors included acute mental health symptoms, financial issues, interpersonal problems, intoxication, and recent stressful life events.

Conclusions: We found that 23 people who died by suicide had gambling documented in their coronial file between 2015 and 2020. Numerous socioeconomic factors, interpersonal issues, and mental health conditions including addiction were also present at the time of death. The numbers in this study are likely an underrepresentation and support the need for improvements in data collection.

1. Introduction

In the last 30 years, gambling and the availability of gambling products have increased dramatically around the world (Abbott, 2020). This has been accelerated by technological advances, with online gambling products available 24 h a day (Wardle et al. 2021). Globally, it is estimated that 46 % of adults and 18 % of adolescents have gambled in the past 12 months (Tran et al. 2024). The rate of problematic gambling among adults' ranges between 1 % and 3 % (Abbott, 2020). In Ireland, it is estimated that 3.3 % of adults (one in 30) engage in problematic gambling and a further 7.1 % having multiple problematic gambling experiences (Ó Ceallaigh et al. 2023).

Gambling harms not only affect the health and wellbeing of the individual who gambles, but also their families, community, and wider society. It is estimated that for every individual who engages in problematic gambling, a further six are negatively affected (Goodwin et al. 2017). These harms are wide ranging and can include financial difficulties, mental health issues, relationship problems, addiction, crime, and suicidality (Office for Health Improvement and Disparities, 2023).

There is a growing body of evidence examining the association between gambling and suicidality. Research from different jurisdictions show that among people receiving treatment for problem gambling, between 22 % and 81 % have thought about suicide, and 7 % to 30 % have made a suicide attempt (Marionneau & Nikkinen, 2022). In

* Corresponding author.
E-mail address: ciara.reynolds@publichealth.ie (C.M. Reynolds).

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Sweden, a 1.8-fold increase in all-cause mortality and a 15-fold increase in suicide mortality was found among those diagnosed with gambling disorder compared to those without (Karlsson and Håkansson, 2018). In the UK, a longitudinal study in young adults aged 16–24 years found that any increase in Problem Gambling Severity Index scores from the first to second timepoint of data collection was associated with an increased rate of suicide attempts at the second timepoint (Wardle et al. 2023). A study from Norway found that between 2008 and 2021 almost 0.5 % of those diagnosed with gambling disorder died by suicide (Kristensen et al. 2025). Suicide accounted for a quarter of all deaths of those with gambling disorder making it the leading cause of death in this population group. There has also been a growing awareness and recognition of gambling as a public health issue however, few studies using coronial data exist (New Zealand Ministry of Health, 2022).

In 2023 in England, the Department of Health and Social Care launched their new suicide prevention strategy with harmful gambling included as one of the six risk factors associated with suicide at a population level (Department of Health and Social Care, 2023). In Ireland, a number of different policy developments are also ongoing in relation to both suicide and gambling. Work will soon commence on the development of a new suicide prevention strategy, offering the opportunity to include gambling as an area for action. The Gambling Regulation Act 2024 was recently enacted and repeals legislation dating as far back as the mid-1900s (Houses of the Oireachtas, 2024).

In the current study, we examined six years of coronial data to identify deaths where gambling was mentioned in the coroners' files. We profiled these cases using qualitative analysis to describe any other proximal and distal risk factors noted in the investigation surrounding the individual's death.

2. Methods

Data from the Irish Probable Suicide Death Study (IPSDS) 2015–2020 were collected through an annual census of closed coronial files for the years in question (Cox et al. 2022). The coroner has responsibility under law for investigating the circumstances of all sudden, unexplained, violent and unnatural deaths in order to establish the who, when, where and how of the death. Researchers had access to all the relevant coronial documents including, but not limited to; autopsy and toxicology reports, inquest files (can include medical and other specialists' reports, depositions from witnesses, family, friends, doctors, hospital medical files etc.). The IPSDS classified a death as a suicide on the balance of probabilities (i.e. civil standard of proof). To this end, it includes all coroner-determined and research-determined suicides, meaning deaths that were more likely than not, based on the weight of evidence, to have been a suicide (Cox et al. 2022; Rosenberg et al. 1988).

All 3,625 deaths in the IPSDS were screened for eligibility. Gambling history is not routinely collected as part of the coroner's investigation. Only deaths where gambling was mentioned anywhere within the coroners' files were analysed in this study. These deaths were identified through multiple database variables. Following the screening for eligibility, one researcher extracted relevant data on each IPSDS death into a new database, from which further analysis was conducted. This included demographic and clinical variables, and adverse events experienced by the deceased.

Firstly, descriptive analyses were conducted in SPSS version 29. Data on population characteristics were presented as proportions except for age, which was presented as mean with standard deviation to provide context for the qualitative findings. Due to the small case numbers, no analysis by sex is provided.

For the purpose of the qualitative data analysis long-term distal (or chronic) and short-term proximal (or acute) risk factors were used as a framework to capture the theoretical and evidence-based factors known to increase one's risk for suicidality (Bloch-Elkouby et al. 2020). Accordingly, distal risk factors are pre-existing vulnerabilities that may facilitate suicidal behaviour (Cohen et al. 2018). They include, for example, previous suicide attempts, a history of recurrent depressive episodes and a range of other social, (Favril et al. 2023) and psychological factors including a history of childhood trauma (King and Merchant, 2008), self-harm (Chan et al. 2016) and mental illness (San Too et al. 2019). Proximal risk factors indicative of an imminent suicide risk identified in the literature include drug and alcohol use (Glenn and Nock, 2014), recent stressful/negative life events (Bagge et al. 2013) a negative affect state include intense anxiety or agitation, insomnia (Pigeon et al. 2012) and physical suffering (Ratcliffe et al. 2008).

Thematic analysis was employed. This is a process of encoding qualitative information under a theme and presenting the repeated information in a systematic way that increases its sensitivity and reliability to answer the research question. This methodology has been employed in previous similar coronial studies (Wallace et al. 2024; Milner et al. 2017; Shiner et al. 2009). While aware of the literature on gambling related suicide and proximal and distal risk factors, the researchers used an inductive process of thematic analysis to identify, analyse, and report repeated patterns (themes) emerging from the dataset.

Coding was done in two phases. In the first phase the authors compiled the extracted data into thematically coded anonymised case examples. The coding and classification system was developed through contact with the data rather than being designed to test prior hypotheses. Initial codes lead to the identification and classification of risk factors proximal to the death and distal (or more long-term) risk factors. After the first stage of coding, the coding structure was reviewed and revised by two other researchers on the basis of mutual consensus between the two coders. The second round of coding was done by one researcher on the basis of finalised codes, however, the final codes are reviewed and approved by both researchers.

The IPSDS secured ethical approval for the extension of coronial data collection through the National Drug-Related Deaths Index (NDRDI) methodology from the Ethics Committee of the Irish College of General Practitioners in 2016.

3. Results

3.1. Sociodemographic characteristics

Gambling was mentioned in the notes of 23 deaths. The mean age was 38.7 years (SD = 9.82). There was an over-representation of males (91 %). Nineteen people were in the labour market, 43 % were in paid employment and 39 % unemployed at the time of death. Almost half (48 %) were recorded as being a parent. Fig. 1 suggests that those with reported gambling have a similar pattern of other risk factors for suicide as those without.

3.2. Method of suicide, verdict and contact with health services

Hanging was the main method of death (83 %), followed by drowning (9 %). Most were coroner-determined suicides (87 % n = 20). More than half (57 %) were in contact with health services prior to their death, with majority having seen a General Practitioner (46 %), followed by a counselling-related service or in/out-patient psychiatric service (38 %).

3.2.1. Distal risk factors

3.2.1.1. Gambling and co-occurring mental health conditions. A history of a mental health condition was noted in more than two in every three deaths. In most instances, it was a mood disorder, either a recurrent depressive disorder or bipolar disorder, while others mentioned schizophrenia and borderline personality disorder. There was evidence of a historical psychiatric inpatient admission for some.

A history of substance use was recorded in more than one-in-two of the deaths. This included, for the majority, a history of drug

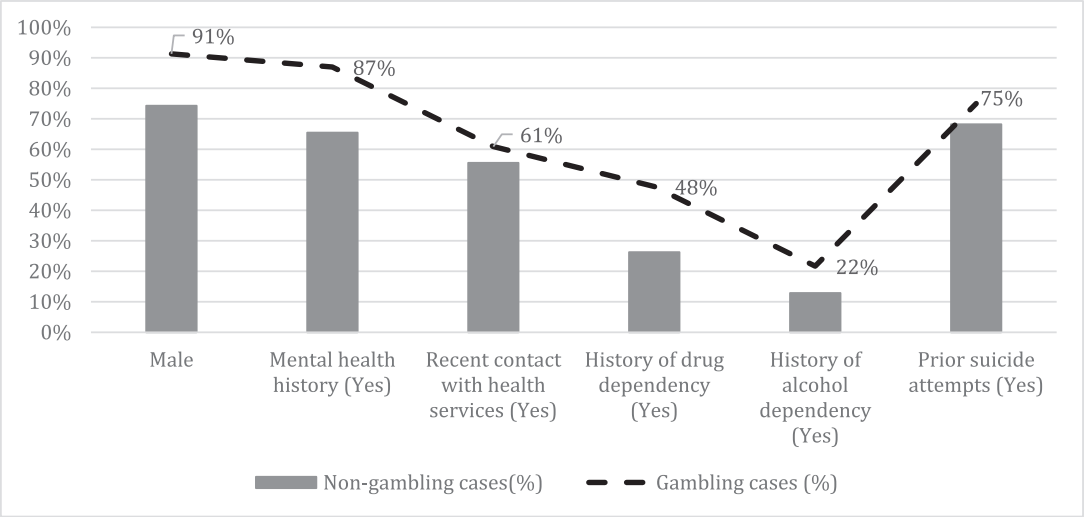

Fig. 1. Proportion of male sex, mental health, drug and alcohol history, suicide attempts and contact with healthcare, in gambling and non-gambling cases.

dependency, most notably cocaine, followed by a history of alcohol dependency, and on occasion, a history of both. In a minority of deaths, there was no evidence of any co-occurring mental health condition.

3.2.1.2. Past suicidal intent and/or behaviour. Past suicidal behaviour was recorded in less than half of the deaths, including previous suicide attempts, suicide ideation, and self-harm. In a few instances, there was evidence of escalation in method, for example from non-fatal overdose to hanging.

3.2.1.3. Exposure to suicide. Exposure to suicide was noted in a minority of cases. In a few instances, a family history of suicide was referenced in the files. On other occasions, the exposure took the form of a suicide by someone (other than family) known to the deceased, and/or a suicide in the community.

3.2.1.4. Other social and environmental distal risk factors. A number of other distal or predisposing risk factors were evident, including adverse childhood experiences; this included, for example, the death of a parent in childhood or a childhood mental health diagnosis. Chronic illness, reclusiveness, and social isolation were evident for some.

3.2.2. Proximal risk factors

3.2.2.1. Acute distress/mental health symptoms. Acute mental health symptoms around the time of the death were noted in more than half of the deaths, most commonly depression, anxiety, and/or agitation. A recent inpatient hospital discharge featured in a number of deaths. These were usually complex cases where there were multiple co-occurring suicide risk factors. Recent changes in psychiatric medication were noted in a small number of deaths.

3.2.2.2. Financial issues. Financial issues emerged as a theme in approximately one-in-two deaths, often appearing multiple times in different ways within the deceased's history. For example, financial concerns related to gambling were explicitly mentioned in addition to income issues due to COVID. In other instances, financial concerns were noted as a proximal risk factor along with "debt with jeopardy.".

3.2.2.3. Interpersonal problems. The main interpersonal problems recorded were relationship difficulties with a spouse. Separation from spouse or relationship breakdown was further mentioned. Other interpersonal problems noted were family conflict and conflict with social networks.

3.2.2.4. Alcohol & drug use/intoxication. Alcohol and drug use around the time of death was mentioned in a small number of cases. This was evidenced through post-mortem toxicology.

3.2.2.5. Other stressful life events. Work-related stress and/or employment issues were explicitly referenced in few deaths. In most instances, the individual was in employment at the time of their death or had significant financial concerns. Legal and/or criminal issues were also noted in the records.

4. Discussion

This study set out to identify and profile deaths in Ireland where gambling was documented in coronial data from the IPSDS (2015–2020). We found that 0.6 % of all deaths had gambling referenced over the six-year period. The vast majority were male and less than half were in employment at the time of death. Distal risk factors included a history of mood disorders, as well as drugs and/or alcohol dependency and past suicide attempts. Proximally, there were reports of recent depression, anxiety, substance use, recent inpatient hospital discharge, financial problems, interpersonal problems, and stressful life events. Thus, gambling was rarely the only recorded risk factor the deceased was experiencing prior to their death, consistent with suicide-literature indicating that suicide results from the interaction of multiple factors (O'Connor and Nock, 2014).

To our knowledge just four other studies that have used coronial data to investigate gambling and suicide cases exist. The first, a study from Finland, reported 21 cases of gambling-related suicide from 3,844 suicide deaths over a six-year period (Selin and Lind, 2024). The majority of deaths were male, with mental distress, substance use, financial problems, previous suicidality, relationship problems, and traumatic events often co-occurring. A recent Australian study using coronial data found that between 2009–2016, 4.2 % of all suicides in Victoria were gambling related; 83 % were male and half were in employment (Rintoul et al. 2023). Only eight of the deceased had a gambling disorder diagnosis (4.4 %); almost two-thirds had evidence of substance use; over a half had a diagnosed mental illness and the majority had evidence of financial concerns. Australia has one of the highest per capita gambling losses in the world (Rowlatt et al. 2023). Additionally, the state of Victoria in particular, has long been aware of the link between gambling and suicide, which may partly explain its higher rates and detection of gambling-related suicides. The first ever study to use coroners' data to

investigate gambling and suicide was published in 1998 based on 44 case records occurring between 1990 and 1997 in the State of Victoria, Australia (Blaszczynski and Farrell, 1998). Similar to our study, it found an overrepresentation of males, high rates of unemployment, previous suicide attempts, mental health problems as well as alcohol and drug use.

Lastly, a study from Hong Kong that used coroners court files from 2003 found that among the 1,201 cases of suicide, 233 (19.4 %) showed evidence of gambling behaviour prior to death (Wong et al. 2010). The high rate of gambling-related suicide in this study is likely due to higher detection. The authors reported that financial-related information, i.e. presence of insurance, debt, and gambling behaviour, is in general thoroughly investigated by the police because it a significant indicator for the suspicion of illegal activity, manslaughter, or homicide and due to its implications for insurance reimbursement to the next of kin. The police generally collect bank and other legal debtor statements and insurance policies from the families of the deceased if the death is suspected to be unnatural (i.e., accidental, suicide, and homicide).

Similar to our findings, a recent systematic review and meta-analysis of 37 psychological autopsy studies found that across 40 risk factors, the presence of any mental, drug or alcohol disorder, suicide attempt history and adverse life events, including relationship conflict and legal problems, were associated with an increased suicide risk (Favril et al. 2022). Based on our results, all the risk factors associated with suicide from Favril and colleagues were found in both our gambling and non-gambling cohort; this indicates that those with gambling-related behaviours already have a vulnerable profile with an increased suicide risk, in addition to their gambling.

There are factors to consider when interpreting the findings of this study. Firstly, this study examines suicide deaths where gambling was mentioned in coroners' files. It is qualitative in nature and does not include analysis of association. It does not infer causality between suicide and gambling. The extent and nature of gambling's contribution to suicide remains unknown in Ireland. Nonetheless, this paper provides Ireland's first estimates of those who died by suicide where gambling was documented in coronial records. There is also variability in the way individual coroners conduct their investigations, which impact on data recording and can thereby contribute to underreporting of gambling. Underreporting can also occur due to the perceived relevance to the coroner's investigation and/or the extent of family and friends' knowledge of the deceased's' gambling behaviour, which may be hidden, given that gambling addiction is one of the most stigmatising mental health problems (Quigley, 2022). Lastly, it must be noted that the sample size is small, although a range 20–30 is considered adequate in qualitative research (Marshall et al, 2013).

A key strength of this study is that the IPSDS uses existing coronial death investigation and administrative data, which has national coverage. In addition, the IPSDS includes coroner and research-determined suicides, thereby ensuring a comprehensive dataset (Appleby et al. 2019). Considering that a suicide death is a rare event, exploring population-based datasets on suicide mortality, similar to the IPSDS, can deepen our knowledge regarding gambling and suicide. This is the first study to investigate suicide deaths where gambling was documented in coronial records in Ireland.

A recent series published in The Lancet Public Health that discusses a public health approach to suicide prevention included gambling as one of its four major risk factors for suicide along with alcohol use, domestic violence and abuse, and suicide bereavement (Pirkis et al. 2024). The series focuses on gambling-related behaviours as the outcome of recommended interventions instead of suicide-related behaviours, as, theoretically, if these strategies can reduce gambling-related behaviours, they are also likely to be able to reduce suicide-related behaviours given the suicide risk associated with gambling. The series recommends a number of interventions and policy actions, mainly focussing on supply-, demand- and risk-reduction strategies including restricting the number of gambling venues, on-screen limit-setting messages regarding time or money spent, restricting gambling advertising, removal of cash machines from gambling venues, alcohol restrictions in gambling venues and gate keeper training for gambling venue staff.

Gambling is a normalised activity that can have devastating consequences for individuals, families, and the wider community. The findings from this Irish study show that in 23 cases gambling was identified in the coroners' files as an event that may have affected the deceased's emotional state prior to suicide. However, the extent and nature of the relationship is largely unknown and intertwined with numerous socio-economic factors, interpersonal issues, and mental health conditions including addiction. Further research is needed to better understand and visualise the complex interplay between gambling and other factors for suicide based on coronial information.

Improvements in the detection of gambling behaviour, standardisation of data collection and advances in data sharing practices could help us to better understand the nature and extent of any relationship between gambling and suicide. Sharing of gambling operator data, such as betting accounts of the deceased, could also aid in identifying gambling products that are higher risk and therefore in need of more stringent regulation. The numbers reported here are likely an underrepresentation but nonetheless support the need for preventative measures for suicide and gambling harm. Thus, a public health approach to reducing gambling harm should be embedded in a wide range of policies including mental health, men's health, substance use, online safety, and suicide prevention.

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CRediT authorship contribution statement

Ciara ME Reynolds: Conceptualization, Project administration, Supervision, Visualization, Writing – original draft, Writing – review & editing. **Gemma Cox:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Validation, Visualization, Writing – review & editing, Writing – original draft. **Suzi Lyons:** Writing – review & editing, Writing – original draft, Methodology. **Helen McAvoy:** Writing – review & editing, Writing – original draft, Conceptualization. **Louise O'Connor:** Writing – original draft, Writing – review & editing. **Katerina Kavalidou:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Validation, Visualization, Writing – review & editing, Writing – original draft.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data availability

The authors do not have permission to share data.

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DIARMAID Ó CEALLAIGH, SHANE TIMMONS, DEIRDRE ROBERTSON AND PETE LUNN

INSTITIÚID TAIGHDE EACNAMAÍOCHTA AGUS SÓISIALTA
ESRI ECONOMIC & SOCIAL RESEARCH INSTITUTE

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THE AUTHORS

Diarmaid Ó Ceallaigh is a Postdoctoral Research Fellow at the Economic and Social Research Institute (ESRI). Shane Timmons and Deirdre Robertson are both Senior Research Officers at the ESRI and Adjunct Professors of Psychology at the TCD. Pete Lunn is a Research Professor at the ESRI and Adjunct Professor of Economics at Trinity College Dublin (TCD).

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LIST OF ABBREVIATIONS

BRU	Behavioural Research Unit
CI	Confidence interval
CSO	Central Statistics Office
DSM-5	Diagnostic and Statistical Manual of Mental Disorders
ESPAD	European School Survey Project on Alcohol and Other Drugs
ESRI	Economic and Social Research Institute
GAA	Gaelic Athletic Association
GRAI	Gambling Regulatory Authority of Ireland
HSE	Health Service Executive
ICT	Information and communications technology
IPH	Institute of Public Health in Ireland
JNLR	Joint National Listenership Research
MHI-5	Mental Health Inventory-5
NDAS	National Drug and Alcohol Survey
NHS	National Health Service (UK)
NSUM	Network Scale-Up Method
OLS	Ordinary least square
PG	Problem gambling
PGSI	Problem Gambling Severity Index
TCD	Trinity College Dublin

EXECUTIVE SUMMARY

Problem gambling (PG) describes gambling behaviour that is disruptive or damaging to individuals, and includes behaviours (e.g., betting more than one can afford to lose) and experiences (e.g., feeling guilt and anxiety about gambling). This study set out to measure the prevalence of PG in Ireland. Previous measures of PG have been undertaken using in-person surveys, but international evidence suggests that gambling is a sensitive behaviour and that people may be reluctant to reveal honestly how much they gamble to an interviewer. For the present study, participants completed the questionnaire online to facilitate greater anonymity and promote more honest responding to sensitive questions.

The study was undertaken in August 2023 by quota sampling, using three different online panels, which generated a total usable sample of 2,850 adults aged 18 and over. The use of online panels and the sampling method more generally means the results may not generalise to people without internet access, those who are over 80 years of age or individuals without the capacity to complete surveys in English (e.g., those with cognitive impairments, some minority groups). To improve representativeness outside of these characteristics, we reweighted responses by age, gender and educational attainment based on Census 2022 figures. The main aim of the study is to measure the prevalence of PG but secondary aims include providing measures of gambling activity and perceptions of gambling among the general population. The focus of the report is on describing and measuring the problem; detailed causal analyses will feature in future reports.

To meet the threshold for PG, individuals must report multiple negative behaviours or experiences associated with their gambling (e.g., borrowing in order to fund their gambling). Based on our sample, we estimate that 3.3% of the adult population are people with PG (with a 95% confidence interval of 2.5–4.0%). This estimate is more than ten times higher than previous estimates of PG in Ireland, when measured in person in 2019 as part of the National Drug and Alcohol Survey (NDAS) (0.3%). The report discusses multiple possible reasons for this difference, including increased anonymity associated with online surveys and sample selection issues.

The figure of 3.3% equates to 1 in 30 adults, or 130,000 people, with PG in Ireland. In addition, we record a further 7.1% (95% confidence interval: 6.0–8.2%) of the adult population who report multiple problematic behaviours and experiences but fall short of the threshold for PG (i.e., they show moderate evidence of PG). This equates to 279,000 people with moderate evidence of PG. We record another 15%

(confidence interval: 13.4–16.5%) of adults (590,000) who report at least one negative experience or behaviour, leaving 75% who show no evidence of PG.

We undertook multiple checks to test the reliability of these estimates (e.g., re-weighting the data, asking about behaviour of friends and family; see Chapter 2). The estimates are robust to different weightings of the sample. They also closely match people's perceptions of the level of PG among their friends and family. Furthermore, having recorded expenditures on all types of gambling (sports betting, online and in-person casino games, lotteries, scratch cards, bingo, card games with monetary stakes and so on), we were able to aggregate expenditures for comparison with industry revenue figures. Based on our sample, we estimate annual expenditure of €5.5 billion, which compares to a (conservative) estimate of €6–8 billion for industry revenue. This spending calculation provides some confidence that our sampling method did not overestimate the amount of gambling taking place in Ireland today. This calculation, together with further tests of sample representativeness and an experimental method of testing for 'social desirability bias' (i.e., the tendency for survey respondents to answer questions in a way they believe will be interpreted by others favourably) in survey responses suggest that our study could still be underestimating PG.

In sum, while it is difficult to measure PG precisely – all methods have their drawbacks – the overall pattern of results that we report provides good evidence that the level of PG in Ireland is much higher than previously thought.

Descriptive statistics show that while PG is more common among adults aged under 50, men and those with lower educational attainment, it is also prevalent among women and those with higher educational attainment. Our sample suggests that 3.6% of men and 2.9% of women have PG. Over 4% of those whose highest educational attainment is the Leaving Certificate or tertiary education below degree level have PG, compared to 2.6% of people educated to degree level or above. PG is highest in the 30–39 years age group (6.7%). Although direction of causality is uncertain, people with PG have substantially worse mental health than people who do not have PG. Family members of people with PG also have worse mental health than average.

With respect to gambling activity in the general population, 74% reported engaging in any form of gambling over the previous four weeks and 35% reported gambling online. The most common forms of gambling are lotteries and scratch cards, followed by betting on horses, dogs and other sports. Casinos and spread betting are the least common forms. Those with PG reported engaging with slot machines and casino gambling more often than those without, particularly online.

People with PG reported spending, on average, more than €1,000 per month on gambling. This group accounted for 28% of total spending on gambling. When people who show moderate evidence of PG are included in the calculation, the implication is that nearly half of industry revenue arises from people experiencing multiple negative effects from gambling. Two-thirds of people with PG state that they would like to gamble less than they currently do, indicating that the current gambling landscape may induce widespread difficulties associated with self-control.

The public has a generally negative attitude to gambling and there is evidence that PG is the subject of stigma. Nevertheless, the public does not see people's character or upbringing as the main reason for PG; instead, people tend to see the availability of opportunities to gamble and exposure to gambling advertising as the main causes. Stressful individual circumstances and social circles also featured strongly as perceived reasons for PG by the public.

The evidence provided in this report has serious implications for understanding the role that gambling plays in Irish life. Although the gambling industry is a large employer, provides entertainment for many consumers and has strong links to sporting activity, the results presented here imply that a large minority of transactions undertaken by the industry involve customers who have PG or display moderate evidence of PG.

The findings provide an important context for debates surrounding the current Gambling Regulation Bill. Broadly, they indicate an alignment between proposals to restrict the marketing and advertising of gambling in the Bill and the public's views about what lies behind PG. The findings on expenditure among those with PG and prevalent desires to gamble less also provide evidence in support of pre-set limits on expenditure and restrictions on gambling paid for via credit. The greater prevalence of PG than previously thought supports prior research on treatment pathways that highlights a need for increased provision of support and services.

CHAPTER 1
Introduction

The extent of 'problem gambling' (hereafter PG) is difficult to measure because gambling behaviour is a sensitive issue. Some people who experience negative effects of gambling may be unwilling to engage in surveys of gambling behaviour, or may be inclined to under-report gambling behaviour to a stranger undertaking a survey (Goldstein et al., 2017; Hing et al., 2016; Kuentzel et al., 2008; van der Maas et al., 2021; Russell et al., 2022; Shnell et al., 2020). From a policy perspective, this is a problem. The gambling industry (i.e., casinos, bookmakers, lotteries, etc.) makes a substantive contribution to economic activity through employment and Exchequer revenue. It provides entertainment for many and has strong economic links to the funding and media coverage of sporting activity (e.g., Inter-Departmental Working Group on Future Licensing and Regulation of Gambling, 2019). However, in deciding on appropriate regulation for the industry, policy must balance economic and social benefits against potential harms, such as detriment to consumers (and their friends and family) who engage in problematic gambling behaviours. This task cannot be accomplished without measuring the prevalence of these behaviours.

The primary aim of the current report is to improve the available evidence on the prevalence of problematic gambling behaviours, general gambling activity and public perceptions of gambling. The focus is on measurement and on providing basic evidence of problematic behaviours in a timely fashion since, at the time of writing, the Gambling Regulation Bill (Houses of the Oireachtas, 2022) is making its way through the Oireachtas.[1] As well as establishing a new regulatory regime for gambling in Ireland, the Bill includes multiple restrictions on the marketing and advertising of gambling products. These include a ban on advertising via electronic means without explicit consent (i.e., where viewers have not opted-in to receive the advertisement), restrictions on the times of day when gambling advertisements are permitted, restrictions on sponsorship activity by gambling companies and a ban on inducements to gambling activities (e.g., offering free bets). These measures are designed to limit problematic gambling (see Langham et al., 2015). The present report aims to provide evidence of their direct relevance to policy and to give context for the appropriateness of these measures, given the constraints they may place upon industry activity.

Once this report has published up-to-date descriptive evidence of PG, gambling activity and perceptions of gambling, the data collected for this study will be

[1] See https://www.oireachtas.ie/en/bills/bill/2022/114/.

explored via a more detailed process of statistical modelling. These analyses will be the subject of one or more separate publications. The present report centres on descriptive analyses that aim to measure the prevalence of PG, the nature of general gambling activity and public perceptions of gambling.

The authors recently published an international literature review of evidence in relation to PG (Ó Ceallaigh et al., 2023). This review considered the international evidence on: matters of definition and measurement; factors associated with PG; attitudes to and perceptions of PG; the relationship to the marketing of gambling; interventions designed to reduce PG; and related issues specific to children and adolescents. Evidence particularly relevant for this report is summarised below but readers interested in greater detail are referred to that report.

The present research exercise is much narrower in focus, relating to one specific finding arising from the review. Specifically, Ó Ceallaigh et al. (2023) concluded, based on previous evidence, that it is likely that existing published estimates of PG in Ireland are too low. The sections that follow consider this conclusion in some detail and explain how it informed the design of the current study.

Our purpose in this study is straightforward: to provide better evidence on the true extent of PG among adults in Ireland. From the outset, it needs to be understood that to provide a single, accurate figure for the prevalence of PG is essentially impossible, due to methodological issues surrounding its measurement. Nevertheless, we set out to improve on existing measurements of PG, insofar as this was possible, in order to provide timely evidence to inform policy.

1.1 MEASURING PROBLEM GAMBLING

The term problem gambling (PG) is used to describe gambling behaviour that is disruptive or damaging to individuals but that may fall short of a clinical diagnosis of 'gambling disorder'.[2] The Problem Gambling Severity Index (PGSI) is a nine-item questionnaire that is widely used to provide population estimates of PG (Ferris and Wynne, 2001). It is the closest we have to an international standard for the measurement of PG. Respondents are asked how often, over the past year, they have had negative experiences from gambling (e.g., gambling causing financial problems for themselves or their family) or engaged in problematic behaviours (e.g., having borrowed or sold something to get money to gamble). The index

[2] Gambling disorder 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 nine-item checklist in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5-TR; American Psychiatric Association, 2022).

contains a separate question for each of the nine experiences and behaviours.[3] Responses are scored as follows: a score of 0 if the item applied 'never' to the participant over the past year; a score of 1 if the item applied 'sometimes'; a score of 2 if it applied 'most of the time'; and a score of 3 if it applied 'almost always'. People with 'problem gambling' (hereafter 'people with PG') are defined as those with a score of 8 or more out of a maximum of 27 across the 9 items. Note that, although 8 out of 27 may seem low, the behaviours included in the index are quite extreme; experiencing many behaviours sometimes or a few behaviours regularly is likely indicative of a severe problem.

Other categories are used to identify those with a score of 1 or 2 and those with a score of 3 to 7; the academic literature has deployed the labels 'low risk' and 'moderate risk' respectively for these groups. However, these terms may be misleading in a policy context because the scoring system is not designed to predict future scores. In other words, it is not the case that those who are classified as 'low risk' are at low risk of *developing* PG. Furthermore, people who fall into these categories exhibit at least one gambling behaviour or experience that most people would consider problematic. Given this, in this report we instead label these groups as showing 'some evidence' and 'moderate evidence' of PG, respectively.

The PGSI was deployed in Ireland as part of the 2019–2020 Irish National Drug and Alcohol Survey (NDAS) (Mongan et al., 2022). The survey estimated the prevalence of PG in Ireland to be 0.3% (approximately 12,000 people), with a further 0.9% (35,000 people) showing moderate evidence and 2.3% (90,000 people) showing some evidence.

It is important to understand that the discussion that follows is not intended as a criticism of this previous research, which was conducted to a high standard using established practices. As stated at the outset, measuring PG is difficult. There are at least two reasons why the figures above may be underestimates. First, the survey was cut short by the onset of the COVID-19 pandemic, having achieved 88% of the target sample, and international evidence suggests an increase in PG since then (Brodeur et al., 2021). Second, and most importantly, the 0.3% estimate was elicited from a survey that was administered in person. It is plausible that people who have negative experiences of gambling might be reluctant to confess this to a stranger, particularly when face to face with them. This problem was understood by those designing and analysing the survey and is noted in the report on the survey's findings.

[3] Other experiences and behaviours asked about in the PGSI are: betting more than one can afford to lose; needing to gamble with larger amounts to get the same feeling of excitement; returning to try to win back lost money; feeling that one has a problem with gambling; being criticised by others for one's gambling behaviour; feeling guilty about the way one gambles; and experiencing gambling-caused health problems, including stress and anxiety.

Indeed, there is relevant international evidence showing that the mode of survey administration has implications for PG prevalence estimates (Nower et al., 2017). For example, in the UK, while surveys based on in-person and phone-based interviews have estimated PG rates at 0.3–0.7% of the adult population (Conolly et al., 2018; NHS, 2023; UK Gambling Commission, 2023), a survey administered online produced an estimate that was many times higher, at 2.7% (Gunstone et al., 2022).[4] We discuss reasons for these differences in detail in the following chapter, but intuitively, this difference may be due to the increased level of anonymity afforded in online surveys; participants may be more willing to answer questions about their gambling behaviour honestly if they do not need to respond in the presence of an interviewer (see also CSO, 2023a). Recent research with senior intercounty Gaelic Athletic Association (GAA) players, which involved administering the PGSI via an anonymous, online survey, recorded a PG prevalence rate of 4.7% (Turk et al., 2023). While there is international evidence to suggest that elite athletes experience PG at higher rates than the general population, a PG prevalence difference that is 15 times higher among senior GAA players than in the general population is implausibly high. One possible explanation is that the 0.3% rate is an underestimate.

Research undertaken by the Institute of Public Health in Ireland (IPH), based on 2019 data, found that 1.3% of 16 year olds (and 5.6% of those who gambled) met the criteria for PG (using a different definition to the PGSI described above; McAvoy et al., 2023).[5] The data for this IPH study were gathered using written questionnaires completed in the classroom. This may have afforded somewhat greater anonymity than a method requiring the participant to answer the PGSI in a one-on-one situation with an interviewer.

Of course, there are other candidate explanations for discrepancies between estimates. Online surveys typically rely on quota samples that set targets for sampling subgroups of the population, rather than on random probability samples. This means that they may be subject to different types of selection effects. For example, in principle, people with PG could be many times more willing to take part in an online survey to receive a small payment, or many times less willing to take part in unpaid, face-to-face ones, compared to the rest of the population. However, to explain the kinds of discrepancies in the figures above, the sample

4 The Gunstone et al. (2022) study was funded by GambleAware, which receives voluntary funding from the gambling industry.

5 The IPH report analysed Irish data collected as part of the European School Survey Project on Alcohol and Other Drugs (ESPAD) in 2019. PG classification depended on affirmative responses to questions about lying about how much money the respondent gambled and feeling the need to bet more and more money. In the 2019 ESPAD, 50 schools were selected at random to participate in the survey, stratified by geographic region, school type (e.g., vocational, secondary), religious affiliation, gender and disadvantage status. Survey data were collected from 3,565 pupils across the selected schools.

selection effects required would need to be very large. We discuss this issue in more detail in Chapter 2.

1.2 SOCIAL DESIRABILITY BIAS

The tendency for survey participants to alter their answers to questions about sensitive topics (e.g., about their gambling behaviour) in a way they believe will be viewed favourably by others is an established phenomenon known as 'social desirability bias' (Nederhof, 1985). It is understood that social desirability bias is likely to be exacerbated in situations where participants must verbalise responses to sensitive questions (Krumpal, 2013); for example, when talking to an interviewer on the telephone or face to face. Krumpal (2013) notes that mode of survey administration moderates socially desirable responding, with more honest answers to sensitive questions generated where the presence of the interviewer is minimised and respondents self-administer. This implies that online surveys should diminish social desirability to the greatest extent.

Identifying and estimating social desirability bias in survey responses typically relies on indirect questioning (Blair et al., 2020; Sagoe et al., 2021; Schnell and Thomas, 2021; Tourangeau and Yan, 2007). The basic idea is to ask a question in such a way that the proportion of positive answers can be inferred for the sample as a whole, but in a way that ensures the answer is ambiguous on an individual level, thereby preserving the participant's anonymity. In Ireland, experimental indirect questioning techniques have been employed to detect social desirability bias in survey responses to issues like attitudes towards minority groups and compliance with COVID-19 mitigative behaviours (McGinnity et al., 2020; Timmons et al., 2021, 2023).

In the current study, we employ two such techniques: the crosswise model and the list experiment. For the crosswise model (Sagoe et al., 2021; Schnell and Thomas, 2021; Yu et al., 2008), a sensitive target question (e.g., about PG) is paired with a non-sensitive question that has a known prevalence (e.g., mother's birth month is January or February). Respondents are asked to give a joint answer to both questions – i.e., that their response to both questions is the same or different. Because we know the aggregate-level probability of endorsing the non-sensitive item (i.e., people born in January and February), we can calculate the anonymously endorsed prevalence of the sensitive item. For the list experiment (Blair et al., 2020; Droitcour Miller, 1984), participants are presented with a list of items, including one sensitive target item, and asked how many apply to them. Crucially, they do not need to report which items, just how many. The average response rate is compared to a control group who see the same list but without the sensitive item, meaning any difference in the average response rate equates to the

anonymously endorsed prevalence of the sensitive item (assuming effective randomisation).

An alternative to using experimental techniques is to ask participants about the behaviour of those in their social network, as their responses about others are less likely to be affected by social desirability bias. The Network Scale-Up Method (NSUM) allows hard-to-count populations to be estimated by asking survey participants how many people there are in their social network who fit the description of interest (Bernard et al., 1991, 2010). By combining this information with information about the size of the participant's total social network, the population prevalence of individuals who fit the description of interest can be estimated. However, it can be difficult to measure people's total social network size accurately. Because of the concealability of PG and the motivation for concealing it that the stigma associated with PG provides (Wöhr and Wuketich, 2021), people's estimates of the number of people with PG in more distant parts of their social network (e.g., neighbours, extended family) are unlikely to be reliable. For these reasons, in the present study we ask only about close friends and immediate family. It should be acknowledged, however, that even when asking about friends and family, the stigma and concealability of PG is likely to downward bias these estimates. Estimates may also not be precise as they rely on subjective opinions from participants of what constitutes PG, though the direction in which this might bias estimates is not clear.

In light of the above factors, to reduce social desirability bias in this study we: estimated the prevalence of PG by administering the PGSI online; and then deployed the two indirect questioning techniques described, as well as the NSUM method, to give additional indications of the likely accuracy of our estimates. By updating prevalence estimates of PG, we can provide an updated analysis of the groups that are disproportionately affected by PG. Descriptive analysis of treatment reporting system data from Ireland suggests that being male, young and from a disadvantaged group are all factors associated with PG (Condron et al., 2022; Kelleher and Lynch, 2023), as does data from the NDAS (Mongan et al., 2022). People with PG are also disproportionately likely to be affected by other mental health issues, in Ireland and internationally (Abbott, 2020; Mongan et al., 2022). Thus, having estimated PG using the techniques described, we also provide a sociodemographic profile of people with PG in Ireland (by age, gender and educational attainment) and test whether there are differences in mental health between people with PG and the general population.

1.3 OTHER MEASURES OF POLICY INTEREST

Because our survey's focus was on gambling, rather than being a more general survey that *included* questions about gambling, it represented an opportunity to

collect much greater detail about gambling behaviours than had been done before. This is important, as there is currently no estimate of the level of gambling activity engaged in by individuals with PG in Ireland. We measure how frequently different groups of gamblers engage in different kinds of gambling activity and how much they spend in doing so. This latter measure is arguably particularly important, because while people with PG comprise a small proportion of those who gamble, they may account for a more substantial proportion of the transactions and revenue generated within the industry.

The measurement of gambling expenditure is also useful for gauging the potential accuracy of our estimates of gambling behaviour. Our study allows us to aggregate responses into an estimate of gambling expenditure for comparison with estimated revenues of the gambling industry. The Inter-Departmental Working Group on Future Licensing and Regulation of Gambling (2019) calculated gross industry revenue (i.e., before winnings are subtracted) to be at €6–8 billion. Almost €6 billion of this could be accurately assessed by combining figures for the total betting duty collected by Revenue with reported sales of lotteries and instant games published by the Regulator of the National Lottery. The uncertainty in the Working Group's €6–8 billion estimate arose from the lack of published figures for online gaming, bingo and gaming in arcades and private members' clubs. The data used by the Working Group came from 2017 (Revenue) and 2016 (Regulator of the National Lottery). The figure could be somewhat higher in 2023, especially given evidence of an increase in PG since the COVID-19 pandemic (Brodeur et al., 2021). However, in the absence of concrete evidence regarding post-pandemic spending, throughout the report we stick to a conservative estimate of €6–8 billion.

Ó Ceallaigh et al. (2023) highlighted other areas of relevance to policy on gambling where evidence is deficient or lacking in Ireland, particularly with respect to the types of gambling people engage in, how often they do so, and public perceptions of gambling. One reasonable policy intervention may be to encourage help seeking among people with PG, yet help-seeking behaviour may be hindered by how gambling is perceived (Clement et al., 2015). We therefore measured how positively or negatively people perceive gambling. To inform communication with the public about gambling, it is also useful to know about perceptions and preferences. Hence we also measured perceived causes of PG among the public, how much people think they gamble relative to others, and whether people would like to gamble less or more than they currently do.

1.4 SUMMARY AND AIMS

Our first aim is to measure the prevalence of PG in Ireland. We are interested not just in those who meet the criteria for PG, but also in those who show some evidence *and* those who show moderate evidence of PG. We do this by

triangulating estimation methods to overcome methodological limitations: administering the PGSI to an anonymous online sample; employing indirect questioning techniques; and relying on social networks using the NSUM. We also seek to provide a basic sociodemographic profile of people with PG in Ireland.

Our second aim is to provide descriptive evidence for other measures of policy interest, including gambling activity, attitudes towards and perceptions of gambling, and the relationship between mental health and gambling behaviour

CHAPTER 2

Data and methods

This study received approval from the ESRI Research Ethics Committee on 17 August 2023 and its design and analysis plan were pre-registered on the Open Science Framework.[6] The study was undertaken online and programmed in Gorilla Experiment Builder (Anwyl-Irvine et al., 2020). The survey was programmed so that the interface was laptop-, desktop- and smartphone-friendly. In this chapter, we first discuss the implications of survey mode administration (i.e., online, telephone) for measuring problem gambling (PG) with the PGSI in order to justify our approach. We then describe the panels we recruited participants from, the sample and the weighting approach before presenting the survey materials and design.

2.1 SURVEY SAMPLING AND MODE

Participants were recruited from online panels held by leading market research agencies in Ireland. There are pros and cons to using such panels in general. Those who subscribe may potentially differ in meaningful sociodemographic and psychological ways from the general population (Baker et al., 2010; Fan and Yan, 2010). However, traditional probability-based methods are subject to similar problems. Outside of the Census, survey respondents always have a choice regarding whether or not to take part. People who agree to take part when contacted by an interviewer, on the doorstep or on the other end of the phone, may differ in a meaningful way from those who decline (Bethlehem, 2016). Evidence suggests that willingness to participate in telephone surveys in Ireland can differ meaningfully based on rapidly formed impressions of survey staff calling from call centres versus private spaces (Lunn, 2017). International evidence suggests that widespread internet penetration, especially via smartphones, coupled with improved techniques of online panel construction (e.g., use of probability sampling to recruit panellists), mean that the quality of responses obtained from online panels can be more suitable than traditional methods when sensitive issues are the focus of interest (American Association for Public Opinion Research, 2020; Ansolabehere and Schaffner, 2014; Chang and Krosnick, 2009; Coppock and McClellan, 2019). In particular, online panels of participants recruited through random sampling methods produce the highest quality data (Pew Research Center, 2020).

Survey mode has been shown to produce variation in estimates of PG in other countries, leading to debate in the academic literature. For example, two surveys

[6] This can be viewed at: https://osf.io/us459/.

conducted in 2022 in Great Britain produced prevalence estimates with an almost ten-fold difference. A nationally representative telephone survey run by Yonder Consulting on 4,001 people aged 16 and over produced a PG prevalence estimate of 0.3%, whereas an online survey of over 18,000 adults (18+) drawn from YouGov's online panel produced a prevalence rate of 2.9% (Gambling Commission, 2023; Gosschalk et al., 2023).[7] There are multiple potential causes of this difference. Most straightforwardly, Newall et al. (2022) show that around 0.7 percentage points of the difference is attributable to a methodological artefact: the telephone survey used a shortened version of the Problem Gambling Severity Index (PGSI), which can produce lower estimates of PG. Newall et al. (2022) conclude that the 2.9% prevalence rate is likely to be more reliable, since it is based on use of the gold-standard scale.[8]

However, gambling-specific selection effects may also account for some of the difference. The two surveys differ not only in mode of survey administration but in whether respondents were recruited from an online panel or through probability sampling. Intuitively, online panels may be expected to overrepresent people who gamble online relative to telephone and in-person surveys. However, in a comparison of multiple nationally representative online (from panels and probability samples) and (probability-sampled) offline PG surveys in the UK, Sturgis and Kuha (2022) show that the only consistent difference between offline and online survey respondents is greater engagement of in-person horse and dog racing betting among offline respondents.[9,10] While there is variation across surveys, there is no consistent bias in online (or National Lottery participation) gambling among online respondents.

Sturgis and Kuha (2022) however find that offline respondents report engaging in gambling less frequently than online survey respondents, regardless of whether online respondents are recruited using quota methods or probability sampling. These authors infer that the offline survey estimates are more accurate, although this inference is difficult to test without data from a sample subject to no selection effects (i.e., a compulsory response survey such as the Census). One avenue for benchmarking survey responses is the revenue generated by the gambling industry. Lower prevalence of gambling in the population implies much higher spend per person among gamblers in order to achieve the scale of revenue

7 The Gosschalk et al. (2023) study that produced the 2.9% rate was funded by GambleAware, which receives voluntary funding from the gambling industry.

8 Of further note is that an in-person, computer assisted self-interview survey using the full PGSI in Northern Ireland in 2016 produced a PG prevalence rate of 2.3% (Dune et al., 2017).

9 The Sturgis and Kuha (2022) study was funded by GambleAware, which receives voluntary funding from the gambling industry.

10 Note that the PGSI has not been administered to panels of solely offline participants, meaning many comparisons are between probability-sampled offline studies and panel-sampled online ones. However, some of the studies included in Sturgis and Kuha (2022) contained probability-sampled online surveys.

observed (thereby implying greater prevalence of problematic gambling behaviours).

Moreover, the authors raise several sources of measurement error in the offline estimates that are likely to bias activity responses downwards. Firstly, they note that gambling activity questions in the offline surveys were preceded by questions on mental health and wellbeing, whereas the online surveys focused specifically on gambling. While the authors dismiss order effects on theoretical grounds, order effects in questionnaires are a well-established source of bias in survey responses, particularly with respect to wellbeing indicators (e.g., Strack et al., 1985). Secondly, they note that instructions provided in the offline survey modes for participants to skip questions may have signalled they could proceed more quickly through the survey by underreporting their gambling activity, thereby incentivising underreporting. Thirdly, sharing our concern, they note the potential for social desirability in downward biasing activity.

Russell et al. (2022) argue that there is no gold standard for collecting data relating to gambling behaviour and harms. Traditional probability sampling methods are subject to biases (including selection effects and social desirability) that lead to activity and harm underestimation. For example, with respect to PG, people with PG may be less likely to respond to invitations to take part in probability sampling studies than people without PG, which would lead to underestimates in these surveys. Russell et al. (2022) note that online panel surveys are also subject to selection effects, but allow for more efficient use of resources and permit longer surveys to be run over shorter fieldwork timelines. Importantly, online surveys also provide greater anonymity and allow more straightforward counterbalancing and randomisation of question ordering to reduce the kind of measurement error discussed by Sturgis and Kuha (2022).

These considerations led us to conclude that online sampling is a more appropriate method for measuring PG in Ireland. Both online and traditional probability sampling methods (e.g., random digit dialling) face important selection effects – people who agree to participate may be different from people who decline. However, online surveys mitigate social desirability in responses to stigmatised behaviours and panels allow for timely data collection to inform important policy changes (Russell et al., 2022).

While the argument for employing an online survey administration mode is straightforward, we are mindful to address issues that exist with recruiting from online panels. Our study was pre-registered, employed mid-survey attention checks and response quality was analysed post-data collection (Pickering and Blaszczynski, 2021). Due to the potential for panel selection effects, we opted for a large sample based on panels from three different agencies that each employ

probability sampling methods to populate their panels. We refer to these as panels A, B and C.[11] All three panels are managed by established firms in the Irish market and are used for regular opinion polling for national outlets, as well as multiple other forms of research (e.g., academic, market research). Importantly, the incentive structure for one of these panels differs from that of the other two. Much of the debate on the quality of data from online surveys derives from the use of paid panels (e.g., Pickering and Blaszczynski, 2021). However, panel C used in this study does not pay participants for participating in studies. Instead, respondents can direct payment to a charity of their choice. Of further note is that respondents from panels A and B complete, on average, only 1.5–2.5 surveys per month, meaning survey participation is neither a reliable nor a sizeable source of income, unlike online panels held in other countries (e.g., Peer et al., 2017). Panel C participants complete an average of 1–2 surveys per month. We expand on the incentive structures below and provide a test of differences in PG estimates across panels. Moreover, we weight the data collected by important sociodemographic variables to strengthen its representativeness and further test the influence of weighting by behavioural variables that may shed light on selection effects into online panels (e.g., online shopping behaviour). We discuss this weighting strategy in the next section.

2.2 SAMPLE AND WEIGHTING

One thousand adults were recruited from each panel, giving a target sample size of 3,000. Participants were incentivised according to their panel norms. Participants from panels A and B were paid €3 for taking part in the study, which lasted approximately 15 minutes.[12] Participants from panel C were not paid and hence completed a shortened version of the study (detailed in Table 2.1). Instead of payment, they recommended a charity to receive a portion of a €1,000 donation.

Data collection occurred from 21 August 2023 to 5 September 2023. Exclusion criteria were: being less than 18 years of age; not being resident in Ireland; and not having the ability to complete online surveys through English. Participants who failed a question designed to check they were paying attention to individual items were also excluded, giving a final sample of 2,850.[13] Differences in sociodemographic

[11] Due to commercial sensitivities, we do not identify the panels in this report. The panels range in size from 20,000 participants to over 40,000. All three panels use probability sampling (e.g., random digit dialling) and offline advertisements to recruit participants to their panel, while panel A also allows existing participants to recommend others to join the panel. Further details on the panels are available from the authors upon reasonable request.

[12] Mean completion time was 14 minutes, median was 12 minutes. The quickest completion time was 4 minutes, the slowest was 89 minutes. The mean (median) was 16 (14) minutes for panel A, 15 (13) minutes for panel B and 13 (11) minutes for panel C.

[13] We employed a forced-response attention check. One item was added to the PGSI requesting participants to select 'almost always' for that question. Participants who failed the attention check were given a second chance to complete the PGSI. Those who failed a second time (98 participants) were automatically removed from the survey and could not complete it. Those who passed the second time were allowed to complete the survey and could earn

composition of the final sample and survey attrition rates across panels are discussed in Chapter 3 (Results).

The sociodemographic characteristics of the full sample are shown in Tables 2.1–2.3. Analyses for the main findings are weighted by participant age, gender and educational attainment to improve representativeness, based on population estimates from Census 2022 (CSO, 2023b). Iterative proportional fitting, or raking, was the method used to generate the sample weights (Deming and Stephan, 1940; Deville and Särndal, 1992). This is a commonly-used calibration method for calculating sample weights (Valliant and Dever, 2018). The weights were trimmed at 0.5 and 2 following a commonly used rule of thumb, so that no participant was given a weight of less than 0.5 or more than 2. Fourteen per cent of participants had their weight trimmed at 0.5, and 8% had their weight trimmed at 2.

TABLE 2.1 SAMPLE SOCIODEMOGRAPHIC CHARACTERISTICS – GENDER

	Male	Female
Census 2022 (CSO, 2023b)	49.0	51.0
Full survey sample – Unweighted	49.2	50.8
Full survey sample – Weighted	49.0	51.0
Panel A sample – Unweighted	48.3	51.7
Panel A sample – Weighted	47.5	52.5
Panel B sample – Unweighted	48.7	51.3
Panel B sample – Weighted	47.8	52.2
Panel C sample – Unweighted	50.5	49.5
Panel C sample – Weighted	52.1	47.9

the payment of €3 for completing the survey (if in panels A or B). Of the 2,999 participants who completed the survey, 149 participants failed the attention check once, and so for quality control purposes we omitted them from our analysis, giving us a final sample for analysis of 2,850.

TABLE 2.2 SAMPLE SOCIODEMOGRAPHIC CHARACTERISTICS – AGE

	<30 yrs	30–39 yrs	40–49 yrs	50–59 yrs	60–69 yrs	70+ yrs
Census 2022 (CSO, 2023b)	18.7	18.2	20.0	16.5	13.0	13.7
Full survey sample – Unweighted	11.9	20.7	18.4	20.9	19.0	9.1
Full survey sample – Weighted	18.4	18.1	19.9	16.7	13.3	13.7
Panel A sample – Unweighted	12.4	21.3	20.9	16.4	18.2	10.9
Panel A sample – Weighted	18.8	19.2	22.0	13.0	11.0	16.0
Panel B sample – Unweighted	12.8	22.1	19.1	20.8	18.1	7.1
Panel B sample – Weighted	20.0	18.7	20.6	17.2	13.3	10.3
Panel C sample – Unweighted	10.4	18.8	15.3	25.6	20.6	9.3
Panel C sample – Weighted	16.4	16.1	16.8	20.3	15.7	14.8

TABLE 2.3 SAMPLE SOCIODEMOGRAPHIC CHARACTERISTICS – HIGHEST EDUCATIONAL ATTAINMENT

	< Leaving Certificate	Leaving Certificate	Tertiary not degree	Degree or higher
Census 2022 (CSO, 2023b)	24.5	19.4	28.6	27.5
Full survey sample – Unweighted	7.1	19.3	28.2	45.5
Full survey sample – Weighted	15.8	21.6	31.9	30.7
Panel A sample – Unweighted	7.3	24.6	29.9	38.2
Panel A sample – Weighted	15.3	26.6	33.5	24.6
Panel B sample – Unweighted	8.3	19.6	27.0	45.1
Panel B sample – Weighted	18.3	21.5	29.8	30.5
Panel C sample – Unweighted	5.7	13.8	27.6	52.9
Panel C sample – Weighted	13.8	16.1	32.3	37.8

Tables 2.1—2.3 show the impact of the weighting on the sample means of age, gender and education for the full sample and by panel. Weighting has no meaningful impact on the gender composition of the sample, owing to the effectiveness of the quota sampling method used in recruiting representative proportions of males and females. The full sample gender split was very close to

Census 2022 figures of 49% male and 51% female before weighting, and exactly matches Census 2022 after weighting. Within individual panels, the gender split does not differ from Census 2022 in any meaningful way either before or after weighting.

Weighting had more of an effect for age than it did for gender. This was because the quota sampling was carried out for three age bands, whereas we weighted on six age bands. Weighting brought our full sample almost exactly in line with Census 2022, in terms of proportions, across each of the six age bands, most notably regarding correcting the undersampling of 18–30 year olds and the oversampling of 60–69 year olds. Within each panel, weighting helped to increase representativeness, but there were still some small discrepancies with Census 2022 figures, which is to be expected given that the weights were calculated to optimise the representativeness of the full sample, rather than individual panels.

Weighting had the biggest effect on the educational attainment of the sample, which again is not surprising given that education was not a criterion used in the quota sampling. An occupational classification was used for the quota sampling, as is standard for the online panels we used, but Census 2022 data are not available for this classification. Weighting improved the match between the proportions across levels of education in our full sample and in Census 2022, particularly in terms of correcting the undersampling of those who did not complete the Leaving Certificate and the oversampling of those who had at least a third-level degree. There are still some discrepancies however, even after weighting, particularly for the proportion of those with less than the Leaving Certificate, which is 8.7 percentage points short of the Census 2022 figure of 24.5%. The patterns are largely the same within individual panels, though the oversampling of those with at least a third-level degree is notably more severe in panel C. The effect of this discrepancy might be a small underestimate of PG, based on research discussed in Ó Ceallaigh et al. (2023) that shows an inverse relationship between education and PG.

Overall, the sample weighting did a good job of adjusting our sample composition to match Census 2022 on age, gender and education. We comment further on the sociodemographic profiles and the relevance of the weighting as required in Chapter 3 (Results).

We also included three non-gambling behaviour measures (smoking, online shopping and radio listenership) to assess the representativeness of the sample against other surveys undertaken with probability samples (CSO, 2022; Department of Health, 2023; Ipsos MRBI, 2023). This was done to check the representativeness of our sample in terms of behavioural characteristics that might not be captured fully by weighting on sociodemographics. Details are provided in

Table A1 in the appendix. We ran robustness checks to check the sensitivity of our main results to additionally weighting the sample on these behavioural variables. More specifically, for this robustness check we calculated sample weights using the same method as described above, except that we used prevalence of smoking, online shopping and radio listenership, in addition to age, gender and education, to calculate the weights. Though less common than weighting only on sociodemographics, additionally weighting on behavioural variables that may be related to the outcome of interest can be more effective in eliminating bias due to non-representativeness in online surveys than weighting on sociodemographics alone (Pew Research Centre, 2018). Smoking is correlated with PG (Mongan et al., 2022), while online shopping is likely to be correlated with general online activity and thus with online gambling. To see the effect of this weighting exercise on sample composition, for the full sample and by panel, see Table A1. In Chapter 3, we note that additionally weighting by behavioural variables does not meaningfully change our estimate of PG.[14]

2.3 MATERIALS AND DESIGN

For convenience, the sequence of blocks of questions is displayed in Table 2.4. After providing informed consent, participants first completed the indirect question experiments (i.e., the crosswise and list experiments).[15] The experiments required randomisation into a treatment and control group. In a list experiment, endorsement of the sensitive item in the treatment group (who see the list containing the sensitive item) is calculated by comparing the average response to the average response of the control group (who see the same list without the sensitive item). Because the estimate is a result of combining responses from two groups, estimates of variation need to also be combined. As a result, point estimates from treatment groups are noisy, meaning these groups require a large number of observations to be sufficiently powered. Hence, because of the statistical power requirements of list experiments, we pre-registered an unbalanced randomisation ratio of 2:1 in favour of the treatment group.[16]

[14] Additionally weighting on these behavioural variables increases the PG prevalence estimate to 3.4% from our main estimate of 3.3%. In our data, smokers are more likely to have PG, while online shoppers are less likely to have PG. The relation between radio listening and PG is negative but statistically insignificant. Thus, it would appear that the increase in the prevalence estimate after weighting on these behavioural benchmark variables is driven by the correction of the oversampling of online shoppers, as the correction of the undersampling of smokers should logically reduce the prevalence estimate. Indeed, when we weight on the sociodemographic variables and smoking only, the prevalence estimate is 3.1%. Worth noting also that the finding that online shopping is negatively associated with PG is somewhat surprising. Further investigation shows that, while online shopping is positively associated with online gambling as we expected, it is negatively associated with in-person gambling.

[15] Participants first read an information sheet about the nature of the study, data protection procedures, anonymity and risks before consenting to taking part.

[16] Pre-registration involves committing the study's design and/or analysis plan to an open repository before data are analysed. It is considered best practice in scientific research for producing more reliable findings.

For the crosswise model, participants in the treatment group (assigned by randomisation) first completed a practice task to familiarise them with the type of questions asked in a crosswise experiment. For the practice task, they were shown two questions: (1) In the last 12 months, have you won money in a lottery?; and (2) Do you have a pet? It was explained that they had a choice of two responses: that the answers to the two questions were either the *same* (both 'yes' or both 'no') or that they were *different* (one 'yes' and one 'no'). As outlined above, participants are not asked whether their response is yes or no to either question, in order to retain anonymity. After completing this practice question,[17] they were then asked to perform the same task for the following two questions, one of which is taken from the PGSI:

(1) In the last 12 months, has your gambling caused any financial problems for you or your household?

(2) Was your mother born in either January or February?

Despite the practice task, participants may have found the question format confusing. For this reason, there was then a double-check question that asked the participant whether they had responded to the previous question by selecting a response at random or by providing an honest response (Schnapp, 2019), the wording of which made clear that the answer would not affect whether they could continue and complete the survey. A random response would limit inferences from the task. The percentage of participants in the treatment group who reported answering randomly (7%) is within the range of 2–19% of random responses found in previous studies, implying we did not observe excessive random responding (Sayed et al., 2022). These participants were excluded from the analysis of the crosswise model. We also note recent research that finds that random responding is unlikely to bias crosswise estimates in a meaningful way (Meisters et al., 2023), and so these participants were once again included in the sample for a robustness check. Participants in the control group only answered the PGSI question in its standard, direct form.

For the list experiment, those in the treatment group were asked to state how many of these four statements applied to them in the previous 12 months:

- 'I bought an investment product (e.g., shares, bonds or mutual funds)';
- 'I bought a lottery ticket or a scratch card';
- 'I felt that there has been too much gambling advertising';
- 'I felt that I might have a problem with gambling'.

[17] As some participants were likely to not have gambled in the previous 12 months, the first page noted that 'some of the following questions may feel like they don't apply to you for various reasons. However, it is important that you answer every question as honestly as you can, even those that you feel don't apply to you.'

The non-sensitive items were selected as follows: one was expected to apply to few participants (investment product purchasing); one was expected to apply to about half of participants (purchasing a lottery ticket); and one was expected to be endorsed by a majority (advertising). For our purposes, it was particularly important that we limited maximum responding (i.e., a response of four) as this would reveal those who endorsed the sensitive item. Just 21 (1%) of participants in the treatment group endorsed all four items. It was made clear that the answers to individual questions did not matter, they just had to say how many of the four applied. The final item in the list is taken from the PGSI. In the control group, participants only saw three statements (i.e., they did not see the PGSI item). They were also asked directly about the sensitive item, in order to provide a comparison between direct questioning and the list endorsement.

Next, as shown in Table 2.4, participants progressed through a more standard set of survey questions. They completed the PGSI and gambling activity questions in a counterbalanced order (i.e., some saw the PGSI first followed by the gambling activity questions, whereas others saw the questions in the reverse order), allowing us to test whether responses to the PGSI items might be affected by previously being asked to recall recent gambling behaviour. A lack of self-awareness about one's own PG, or self-denial, may downward bias PGSI estimates. Asking people to recall their recent gambling behaviour before answering the PGSI may help to mitigate this downward bias by making one's own behaviour more salient while responding to the PGSI.

The construction of the gambling expenditure questions required careful consideration, as previous research highlights that survey respondents often struggle to accurately estimate their gambling spend (Volberg et al., 2001). To combat this, we designed the gambling activity questions such that participants were first asked to recall which activities they engaged in, before then being asked about their estimated spend within a band for each activity they reported. By first prompting recall of the activity and then asking specifically about that activity, our aim was to guide respondents through individual episodes and place the burden of aggregation on our side. After selecting a band of expenditure, participants were presented with a slider, with end points bounded by the band they selected (for example, if they selected €10–€20, the slider ranged from €10 to €20). We employed a similar approach to measuring close contacts during the COVID-19 pandemic in the Social Activity Measure (Lunn, 2021), which provided evidence that participant-side aggregation is prone to biases not observed when researchers perform the aggregation based on more granular data. Similarly, Lucas et al. (2021) showed that researcher aggregation of diary-based data correlate much more strongly with experience-sampled data than with traditionally-used global measures of behaviour.

The next set of questions concerned gambling among their friends and family. We first asked participants to count, separately, their close family members and friends. We then asked them to state whether they felt any of them had PG and, if so, how many. Participants from panels A and B then completed additional questionnaires about their childhood experiences of gambling and their perceptions of and attitudes towards gambling. These were not asked of Panel C, in order to reduce the length of time taken to complete the survey, as these unpaid respondents were accustomed to shorter surveys. All participants answered the three questions that served as behavioural benchmarks to compare against other nationally representative surveys, as well as the five-item version of the Mental Health Inventory (MHI-5, Berwick et al., 1991; Veit and Ware, 1983), before lastly completing standard sociodemographic questions.[18] Participants had the opportunity to report any issues with the study at the end. None reported issues with their responses that required response removal. All participants were sent contact information for PG and mental health support services as part of a debrief message after exiting the survey.

Where possible, the survey questions were adapted from or relied on previously published research. The final column in Table 1 lists the relevant references. All materials are available in Appendix C and on the study's Open Science Framework page.

[18] Regarding mental health, participants were asked how much of the time over the previous four weeks they had: been a happy person; felt calm and peaceful; been a very nervous person; felt downhearted and blue; and felt so down in the dumps that nothing could cheer them up. Responses were elicited on a Likert scale (None, A little, Some, A good bit, Most, All).

TABLE 2.4 STUDY TASKS

Study task	Description	Panel	References
Crosswise experiment	A method of indirect questioning used to estimate social desirability in survey responses. Participants in the treatment group reported whether their response to two items (one sensitive and one non-sensitive) was the same or different. Participants first completed a practice question. Participants in the control group were only asked directly about the sensitive item.	A, B, C	Sagoe et al. (2021); Schnell and Thomas (2021); Yu et al. (2008)
List experiment	A method of indirect questioning used to estimate social desirability in survey responses. Participants reported how many of a list of items applied to them. The list included one sensitive item. Participants in the control group were asked how many of the list without the sensitive item applied to them. The control group was also asked directly about the sensitive item.	A, B, C	Blair and Imai (2012); Timmons et al. (2021)
Problem gambling	Participants completed the nine-item PGSI, which is used internationally to categorise levels of PG. An example item is, 'When you gambled, did you go back another day to try to win back the money you lost?' There reference period is the previous 12 months.	A, B, C	Ferris and Wynne (2001)
Gambling activity	Participants selected from a list the types of gambling they had engaged in over the previous four weeks (if any). Follow-up questions were tailored to the participant for details on their frequency and spend for each type of gambling they engaged in. Participants were also asked whether their recent behaviour was usual for them.	A, B, C	UK Gambling Commission (2023)
Family and friends	Participants reported how many close friends and immediate family members they have, and how many of them they think have a problem with gambling. Where relevant, participants reported the extent to which they worried about their child(ren)'s gambling. They also completed a six-item questionnaire on the impact of a close friend's/family member's gambling.	A, B, C	Dowling et al. (2014); Kang (2023); Svensson et al. 2013); UK Gambling Commission (2021)
Childhood experiences*	Participants were asked about their experiences of gambling before turning 18, their parent's/guardian's gambling activity and the extent to which their parent/guardian had approved of gambling.	A, B	UK Gambling Commission (2021)

TABLE 2.4 (CONTD.) STUDY TASKS

Study task	Description	Panel	References
Own gambling perceptions	Participants estimated their gambling spend relative to other adults in Ireland over the previous four weeks. They also reported whether they would like to gamble more, less or the same as they did at the time of completing the survey.	A, B	Robertson et al. (2023)
Attitudes and stigma	Participants completed the eight-item Attitudes Towards Gambling Scale (e.g., 'Gambling should be discouraged'), a six-item stigma towards gambling scale (e.g., 'Moving next door to a person who has a problem with gambling') and a ten-item causes of PG scale (e.g., 'The way they were raised', 'Widespread availability of opportunities to gamble').	A, B	Canale et al. (2016); Hing et al. (2016); Link et al. (1999); Martin et al. (2000); Orford et al. (2009); Robertson et al. (2023)
Behavioural benchmark questions	Participants completed three behavioural questions to test the representativeness of the sample against other national surveys. The questions assessed smoking behaviour, online shopping and radio listenership.	A, B, C	CSO (2022); Department of Health (2023); Ipsos MRBI (2023)
Mental health	Participants completed the five-item Mental Health Inventory as a measure of their mental health during the previous four weeks.	A, B, C	Berwick et al. (1991); Veit and Ware (1983)
Sociodemographic questions	Participants completed standard sociodemographic questions on their gender, age, birthplace, ethnicity, county they live in, rural/urban location, household size, children in household, marital status, employment status, education, social class and income.	A, B, C	

Note: *We do not report on childhood experiences here. These will feature in subsequent outputs. PGSI=Problem Gambling Severity Index.

CHAPTER 3
Results

3.1 PREVALENCE OF PROBLEM GAMBLING

Table 3.1 shows the proportions of people estimated within each category of the Problem Gambling Severity Index (PGSI). The percentage of people who have problem gambling (PG) is estimated at 3.3%. This is over ten times the percentage estimated previously in Ireland, of 0.3% (Mongan et al., 2022). The primary differences between Mongan et al. (2022) and our approach is the absence of interviewer presence when completing the PGSI and the use of an existing panel of online participants. A further 7.1% of people are estimated to be in the 'moderate evidence' category, and 15% are estimated to be in the 'some evidence' category. The corresponding figures in Mongan et al. (2022) were 0.9% and 2.3% respectively.

Our figures derived from this online sample are therefore much higher than previous estimates, which were based on in-person interviews. Similar variation is observed in other countries. Estimates from the UK vary between 0.3% in a telephone survey to 2.9% in an online survey (UK Gambling Commission, 2023; Gosschalk et al., 2023). A Northern Ireland survey using a computer-based questionnaire completed by the respondent in the presence of an interviewer produced a PG estimate of 2.3% (Dune et al., 2017). The average prevalence rate in recent studies carried out over the phone or face-to-face in several countries is 1% (Gabellini et al., 2023). Consequently, before considering other research questions, we check the robustness of our results with respect to sample weighting and the variation across the three online panels used to make up the full sample.

To check the sensitivity of our results to the method of calculating the sample weights, we ran robustness checks using different upper and lower thresholds for the sample weights. We also ran a robustness check using sample weights calculated with the behavioural benchmark variables described in the previous chapter (smoking, online shopping and radio listening), in addition to sociodemographic variables. Finally, we ran the analysis without sample weights. The estimates of the prevalence of PG were very similar across all of these checks, ranging from 3.1% in the unweighted sample to 3.4% when weighting on behavioural variables (Tables A2–A5).

TABLE 3.1 PROPORTION IN EACH PGSI CATEGORY (%)

	Problem gambling	Moderate evidence	Some evidence	No evidence
Prevalence	3.3	7.1	15.0	74.7
Lower CI	2.5	6.0	13.4	72.8
Upper CI	4.0	8.2	16.5	76.5

Notes: Weighted estimates. N=2,850. CI=Confidence interval. Problem gambling is defined as a score of 8 or above out of 27 on the PGSI, with moderate evidence defined as a score of 2–7 and some evidence a score of 0 or 1.

We also checked the sensitivity of our results to the online panels used. Table 3.2 shows the estimated percentage of individuals with PG for each panel. The estimates for panels A and B are largely similar to each other, at just over 4%. The estimate for panel C is lower, at 1.2%. A logit regression (Table A6) predicts PG status from participant panel and confirms that this difference is statistically significant, even when controlling for sociodemographic variables. The following analyses of the composition of the sample recruited from each panel and of attrition rates in our survey by panel shed some light on plausible explanations for this disparity.

One reason for the disparity may be differences in incentive structures across panels. Participants from panels A and B received small reimbursements for their time (€3) whereas participants from panel C were not personally reimbursed. Hence, if problem gamblers are more likely than the general population to take part in surveys for compensation, panels A and B may overestimate PG. While this selection effect is intuitively reasonable, it is worth noting that panellists from both panels A and B complete, on average, only 1.5 to 2.5 surveys per month. In other words, the earnings from such surveys are unlikely to contribute to much gambling activity and, for these panellists, completing surveys is not a reliable source of income. Alternatively, if problem gamblers are less likely to take part in unpaid opinion polls, panel C may underestimate PG as participants in panel C surveys are never paid.

The incentive structure and primary purpose of panel C as an opinion poll may have further implications for the sociodemographic breakdown of the panel. Relative to Census 2022 figures for the Irish population, and relative to panels A and B, panel C undersamples individuals under 50 years of age and oversamples those over 50 (see Table A8 in the appendix). Panel C also undersamples individuals who did not complete secondary education ('less than Leaving Certificate') and those for whom completing secondary education is their highest educational attainment ('Leaving Certificate'). It oversamples those who have at least a degree (Table A9). This is important, given that international research shows that PG tends to be more prevalent among younger age groups, and among those with lower educational attainment (Ó Ceallaigh et al., 2023). While panels A and B also undersample those with at most a secondary education, the undersampling is not as severe as it is for

panel C and crucially arises because of an undersampling of the 'less than Leaving Certificate' group, and not because of undersampling of the 'Leaving Certificate' group. Panel C's undersampling arises because of undersampling of both the 'less than Leaving Certificate' and 'Leaving Certificate' groups. This is important because over three-quarters of the group of people in Ireland in the 'less than Leaving Certificate' group are over 50 years of age (CSO, 2023b), due to intergenerational differences in educational attainment. We show later in this Results section that PG rates are lowest in this group among the four education groups we analyse, and are highest in the 'Leaving Certificate' group, for which panel C undersamples but panels A and B do not. Based on sample representativeness, therefore, the disparity between panels may reflect underestimation of PG in panel C.

A second factor requiring consideration is study dropout (i.e., attrition). The Behavioural Research Unit (BRU) team at the ESRI generally finds that a small proportion of people who begin an online study drop out part way through. This can happen for reasons connected to the survey, such as fatigue, or reasons unconnected to the survey; for example, the participant is interrupted and does not return to complete the questionnaire. Such participants are not included in final samples. In the present case, the number of people from panel C who dropped out during the study was unusually high (716 participants, or 41% of all eligible participants who started the survey). This proportion is over 4 times as high as the number from panel A dropping out (153, or 13%) and 12 times higher than the number from panel B dropping out (60, or 5%) (Table A10). This might be partly due to the incentive structure for panel C. Moreover, panel C is a relatively newer online panel, where subscribers primarily participate in opinion polling rather than research studies. Another plausible explanation for the higher dropout, therefore, is that participants from panel C were less comfortable answering questions about their own behaviour, perhaps especially about potentially sensitive behaviours. Further investigation revealed that 46% of panel C dropouts occurred at the start of the survey when participants were told that it was a survey about gambling. A further 14% dropped out at the first question about gambling. We conjecture that, if participants in panel C with PG were more likely to drop out at these points than those without PG, then people with PG would have been underrepresented in our final panel C sample.

It should be noted that a lower prevalence of people who gamble in panel C is unlikely to explain the lower prevalence of PG in this panel. While the prevalence of people who gambled in the previous four weeks is a little lower in panel C than in the other two panels, in the subsample of those that gambled, the prevalence of PG still remains much lower in panel C relative to the other two panels. See Table A12 for details.

Given the above, on balance, we view it as more likely that PG was underestimated in panel C. We provide further relevant evidence in our analysis of expenditure below. Nevertheless, in the absence of definitive evidence in this regard, we have taken a conservative approach and given panel C equal weight in calculating our main estimates of PG. It is also worth noting that the estimate of PG from panel C, though likely underestimated, is still four times the previous in-person estimate of 0.3%.

TABLE 3.2 PROPORTION WITH PROBLEM GAMBLING (%), BY PANEL

	All panels	Panel A	Panel B	Panel C
Prevalence	3.3	4.1	4.4	1.2
Lower CI	2.5	2.7	2.9	0.4
Upper CI	4.0	5.5	5.8	1.9

Notes: Weighted estimates. Full sample N=2,850. Panel A, N=940; Panel B, N=944; Panel C, N=966. CI=Confidence interval.

Further evidence to support the assertion that the prevalence of PG is likely to be substantially higher than previous estimates is provided by estimating the prevalence of PG from people's perceptions of the number of people with PG in their friendship networks and immediate family; estimates using the Network Scale-Up Method (NSUM). The NSUM estimates are shown in Table 3.3. The top row shows unadjusted estimates of the percentage of close friends and immediate family perceived to have a problem with their gambling, which are 2.6% and 2.1% respectively. However, the regression in Table 3.4 regresses number of friends and family onto PG status and shows that people with PG have significantly fewer friends and family members than those without PG. This means that these unadjusted figures are likely to be underestimates, simply because people with PG are less likely to be within friendship networks. To correct for this, we adjust the figures by multiplying them by the ratios of friend and family network sizes of those without PG to the network sizes of those with PG. The final row of Table 3.3 shows the adjusted estimates, which are 3.2% for friends and 2.4% for family members. Detailed calculations of these unadjusted and adjusted estimates are shown in Table A13 in the appendix. The final figure for friends is hence very close to our main estimate of PG among individual participants. The figure for family members is somewhat lower. However, the survey question asked participants how many people were in their immediate family, and how many of these had PG, and did not ask them to exclude family members under age 18. It is plausible that this would depress the immediate family PG figure and so the somewhat lower figure for immediate family is not surprising. In general, the numbers correspond well with our main estimates.

While considering these figures, there are several potential sources of imprecision in the estimates. Individuals may have incomplete awareness of PG among their friend and family groups, due to the high concealability of PG (Fulton, 2019; Wöhr

and Wuketich, 2021), which might lead them to underestimate the prevalence of PG among their friends and family. This underestimation may be greater for family than friends, given that stigma among family may be greater than stigma among friends, although behaviour of close family may be more easily observed. There is also no reason to presume that individuals' subjective estimates of when gambling is 'problematic' will accord exactly with the definition of PG derived from the PGSI; people might be more or less likely to view gambling behaviours as a problem. Nevertheless, the concordance between our main estimate of PG and these estimates from the alternative method of recording the perceptions of friends and family gives comfort regarding the validity of our main estimate.

We undertook further investigations of perceived PG among family and friends across the three survey panels (Tables A14–A16). Unlike our estimates of individual PG, we found no substantive differences between the panels in relation to perceived PG among friends and family.

TABLE 3.3 ESTIMATED PREVALENCE OF PROBLEM GAMBLING AMONG FRIENDS AND FAMILY

	Friends	Family	Friends and family
Prevalence estimate	2.6	2.1	2.3
Lower CI	2.3	1.8	2.1
Upper CI	2.9	2.3	2.5
Adjusted prevalence	3.2	2.4	2.7

Notes: Weighted estimates. N=2,850. CI=Confidence interval.

TABLE 3.4 OLS REGRESSION OF ASSOCIATION BETWEEN FRIENDS/FAMILY NETWORK SIZE & PG

	(1) Friends	(2) Family	(3) Friends and family
PG	-0.923*** [-1.432,-0.414]	-0.615** [-1.213,-0.016]	-1.538*** [-2.357,-0.719]
Dependent variable mean	4.079	5.746	9.825
N	2,850	2,850	2,850

Notes: 95% confidence intervals in brackets. Three separate regressions are shown, one per column. The dependent variable in each case is denoted in the column header. No controls are included in these regressions as, for the purpose of identifying if an adjustment is necessary to the NSUM estimate, we only need to identify if people with PG have fewer friends and family than those without PG, without conditioning on any other variables. The dependent variable mean shown is for the full sample included in the relevant regression. *p<0.10; **p<0.05; ***p<0.01. OLS=Ordinary least square.

We also counterbalanced the order in which participants received a block of questions about their gambling behaviour over the previous four weeks and the PGSI questions. Randomisation was done on a 1:1 basis between those who answered the gambling behaviour questions before the PGSI, and those who answered them after the PGSI. The two groups were well-balanced on sociodemographic characteristics (see Table A17). We hypothesised that the increased salience of one's own gambling behaviour, brought about by answering

such detailed gambling behaviour questions first, might lead to increased PGSI estimates of PG. However, Table 3.5 presents logistic regression models predicting PGSI status from whether the participant saw the PGSI before or after completing the gambling activity questions. The models show that the likelihood of being categorised as having PG, with moderate evidence of PG or with some evidence of PG did not significantly differ between those who answered the gambling behaviour questions before the PGSI and those who answered them after it.

TABLE 3.5 LOGIT REGRESSIONS TESTING THE EFFECT OF QUESTION ORDER ON PGSI CATEGORY

	(1) Four-level categorical variable	(2) Problem gambling	(3) Moderate evidence	(4) Some evidence
Gambling behaviour questions before PGSI	0.917 [0.770, 1.092]	0.819 [0.531, 1.262]	0.883 [0.655, 1.191]	1.004 [0.812, 1.242]
Dependent variable mean	0.367	0.033	0.071	0.150
N	2,850	2,850	2,850	2,850

Notes: Exponentiated coefficients (odds ratios); 95% confidence intervals in brackets. Dependent variable in column 1 is a four-level categorical variable: =0 if there is no evidence for PG, =1 if there is some evidence, =2 if there is moderate evidence, =3 if the participant is scored as having PG. Dependent variables in columns 2–4 are binary indicators for having PG, moderate evidence of PG, and some evidence of PG, respectively. The regression in column 1 is an ordered logit regression, while the regressions in columns 2–4 are binary logit. The reference category is those who saw the PGSI before the gambling behaviour questions. Controls: sociodemographic weighting variables. $^{*}p<0.10$; $^{**}p<0.05$; $^{***}p<0.01$.

3.2 INDIRECT TECHNIQUES

3.2.1 Crosswise model

The results from the crosswise model experiment are shown in Table 3.6. As noted in the methods section, randomisation was done on a 2:1 ratio of treatment to control, to maximise statistical power. Table A18 in the appendix shows that randomisation was well balanced. The results of this experiment show that, even in our anonymous online survey, our PGSI estimate of PG may be depressed by social desirability bias, and therefore may very well be an underestimate. As shown in Table 3.6, when estimating endorsement of a single item from the PGSI, our crosswise model estimate was over three times larger than the estimate from a direct question, suggesting that the direct estimate is likely to have been depressed by social desirability bias. If anything close to this level of social desirability bias plays a role in people's direct answers to all nine items in the PGSI, then our PG estimate of 3.3%, despite being much higher than previous estimates, may still be too low.

TABLE 3.6 CROSSWISE MODEL AND DIRECT ESTIMATES OF RESPONSE TO, 'IN THE LAST 12 MONTHS, HAS YOUR GAMBLING CAUSED ANY FINANCIAL PROBLEMS FOR YOU OR YOUR HOUSEHOLD?'

	Prevalence estimate	Lower CI	Upper CI	N
Crosswise model (Treatment group)	11.7	8.8	14.7	1,746
Direct question (Control group)	3.6	2.2	5.0	968

Notes: Weighted estimates. Crosswise model sample excludes those who reported randomly responding to the crosswise model question (n = 136). Sample sizes in both groups are different due to the imbalanced randomisation procedure described in Chapter 2. CI=Confidence interval.

It is noteworthy that the crosswise estimate of 11.7% endorsement of this PGSI item seems intuitively high, relative to an overall estimated PG rate of 3.3%. However, the crosswise experiment employed just a single item from the PGSI. Hence, endorsees could conceivably come from the group of individuals with any PGSI score above zero (i.e., all those with some evidence, moderate evidence or PG). This combined group makes up one-quarter of our sample, and so our crosswise estimate captures less than half of this group. This is an important point. The crosswise model is not intended to produce a point estimate, but to test the significance of any social desirability bias effect and its direction. The result implies a downward bias in responses to PGSI items.

A criticism of the crosswise model approach is that responding to the crosswise question with a random choice can bias the estimate towards 50% (Schnapp, 2019), which in the case of a low prevalence behaviour such as PG would bias the estimate upward. To mitigate this risk, following the method of Schnapp (2019), we excluded participants who reported answering randomly to the crosswise question, as detailed in the methods section. This excluded 7% (136 participants) from the sample.[19] The question wording was as follows: 'Did you respond on the previous page by just clicking one of the options at random? Please answer honestly – your response won't affect your payment or ability to proceed with the survey'. Not excluding these participants who reported randomly responding gives a higher estimate of 13.1%, compared to our estimate in Table 3.6 of 11.7%.

However, it is possible that not all participants who answered randomly admitted to doing so when asked. For this reason, we ran simulations to check how many additional participants would have had to give a random response to the crosswise question, without admitting it, for the confidence intervals for the crosswise estimate and the direct question estimate to overlap. These simulations show that an additional 17% (300 participants) of the remaining sample would have had to have answered randomly in order for the confidence intervals to overlap, which

[19] When these random respondents are excluded from our PGSI estimate of PG, it makes no meaningful difference to the estimate (falls by 0.1 percentage point to 3.2%).

would see the crosswise estimate decreasing to 8.1% (confidence interval:[5.0%,11.2%]). See results of the simulations in Table A19. Bearing in mind that the final sample excludes those who failed an attention check measure, it seems unlikely that the question asking respondents to self-report whether they answered randomly or not would detect less than one-third of all respondents who answered randomly, given the assurances in the question wording that admitting to answering randomly would not affect payment or survey progression. While there may be some undetected random responses, the simulation implies that the crosswise estimate would remain significantly higher than the direct estimate, giving evidence of social desirability bias in responses.

3.2.2 List experiment

Unfortunately, standard analysis techniques showed that the list experiment was not successful in mitigating bias from responses. One assumption of list experiments is that the presence of the sensitive item does not alter how participants respond to other items in the list, known as a 'design effect'. We tested for a design effect using the *kict* package in Stata (for a description of how this test is conducted, see Blair and Imai, 2012; see also Tsai, 2019). Results showed indication of a design effect, such that participants in the treatment group (who saw the sensitive item) were more likely to report that none or one of the items applied to them than participants in the control group (Z = -3.49, p =.002; Z = -2.28, p =.012). The test for design effects was statistically significant (λ = 13.81, p <.001), suggesting that the list responses were invalid. The result suggests that some participants who saw the sensitive item in the list may have sought to depress their true response in order to avoid the possibility of being associated with the sensitive item.

3.3 GAMBLING ENGAGEMENT AND SPEND IN IRELAND

In this section we report responses to questions about types of gambling activity and gambling expenditure. Our focus is not just on those with PG, but on all those who report engaging in gambling, in order to present a detailed picture of gambling activity in Ireland.

As can be seen in Table 3.7, we estimate that almost three-quarters of people have spent money on gambling in the past four weeks, with 35% of people doing so online, and 61% in person. The most popular forms of gambling were lotteries and scratch cards, followed by betting on horses, dogs and other sports. Table 3.8 shows the analysis for those with PG. The proportion of those with PG engaging in in-person gambling was approximately the same as for those with PG engaging in online gambling, at over 80%. In addition to lotteries, scratch cards and animal and sports betting, slot machines and casino gambling were additionally popular for

those with PG, more so in their online form than in person. This is consistent with findings from previous research that these forms of high frequency, fast payout gambling are strongly associated with PG (see Ó Ceallaigh et al., 2023). In fact, people with PG were more likely to spend money on online forms of gambling than on in-person forms.

Of those with PG, 96% had gambled in the previous four weeks, while the corresponding figures for those with moderate evidence, some evidence and no evidence of PG were 94%, 93% and 67%, respectively.

TABLE 3.7 PROPORTION THAT SPENT MONEY ON GAMBLING IN THE PREVIOUS 4 WEEKS

	All modes	Online	In person
All types	74.1	35.1	60.9
All except gambling between friends	73.6	35.1	59.6
Lotteries	55.9	16.8	43.6
Scratch cards	35.3	5.6	31.4
Horse and dog betting	17.1	11.1	8.8
Sports betting	16.0	12.7	5.4
Bingo	8.4	2.5	6.3
Gambling between friends	6.6	–	6.6
Slot machines	6.2	3.3	3.3
Casino gambling	3.7	3.1	0.9
Spread betting	1.7	1.7	–
Other	2.9	2.3	0.7

Notes: Weighted estimates. Full sample N=2,850 (including both those who did and did not gamble in the previous four weeks). Spread betting refers to betting on the value of an (unowned) asset.

TABLE 3.8 PROPORTION OF THOSE WITH PG THAT SPENT MONEY ON GAMBLING IN THE PREVIOUS 4 WEEKS

	All modes	Online	In person
All types	96.1	85.4	81.5
All except gambling between friends	96.1	85.4	78.1
Lotteries	73.2	26.2	54.8
Scratch cards	65.0	24.7	46.4
Sports betting	59.6	48.6	22.4
Horse and dog betting	50.1	33.3	32.4
Slot machines	42.0	32.0	11.8
Gambling between friends	27.0	–	27.0
Bingo	26.7	19.4	10.5
Casino gambling	21.9	18.5	6.0
Spread betting	7.9	7.9	–
Other	6.2	3.5	2.7

Notes: Weighted estimates. N=87.

We also found gender differences in activity, detailed in Table 3.9. Men are more likely to gamble online than women. Men are more likely to spend money on horse

and dog betting and sports betting, while women are more likely to play bingo and to play slot machines in person. We do not report a gender-based comparison of PG due to low sample sizes.

TABLE 3.9 PERCENTAGE THAT SPENT MONEY ON GAMBLING IN THE PREVIOUS 4 WEEKS BY GENDER

	All modes		Online		In person	
	Women	Men	Women	Men	Women	Men
All types	72.0%	76.4%	27.6%	43.3%	61.1%	60.8%
All except gambling between friends	71.7%	75.8%	27.6%	43.3%	60.2%	59.2%
Lotteries	54.6%	57.7%	15.1%	18.7%	43.2%	44.4%
Scratch cards	38.5%	31.9%	6.6%	4.4%	34.0%	28.8%
Horse and dog betting	10.3%	24.2%	5.7%	16.9%	5.6%	12.2%
Sports betting	6.6%	26%	5.5%	20.2%	1.7%	9.4%
Bingo	11.1%	5.6%	3.4%	1.5%	8.0%	4.5%
Gambling between friends	3.9%	9.3%	–	–	3.9%	9.3%
Slot machines	7.6%	4.8%	3.6%	2.9%	4.2%	2.3%
Casino gambling	2.2%	5.3%	2.0%	4.3%	0.4%	1.5%
Spread betting	0.7%	2.7%	0.7%	2.7%	–	–
Other	3.1%	2.7%	2.4%	2.2%	0.8%	0.7%

Notes: Weighted estimates. N=2,835.

Mean gambling spend per week per person was estimated at €27 (median = €7).[20] This implies a total annual spend on gambling by the adult Irish population of €5.5 billion.[21] This is slightly below the estimate of gross industry revenue (before winnings are subtracted) of €6–8 billion, as described in Section 1.3. This is an important finding for the current report, given that our measures of PG and gambling behaviour are higher than those previously reported. If, for some reason, our survey methods were oversampling people with high gambling expenditures, we might expect to see an overestimate of expenditures when we aggregate our survey responses like this to obtain an implied total expenditure. In fact, the number is still somewhat below estimated industry revenue.

On average, spending is evenly split between online and in-person gambling. What is striking, however, is that we estimate that 28.3% of the overall expenditure on

20 We exclude gambling between friends from this estimate because these wagers may not necessarily involve monetary exchanges, and do not constitute industry revenues. When spending on gambling between friends is included, mean spend per person per week is €28 and median spend is €7 per week. See Table A20. When we exclude individuals who reported responding randomly to the crosswise question, mean spend is €25 per week and median spend is €7 per week.

21 This was calculated as €27 per week x 52 weeks in a year x 3.9 million adults (18+) in Ireland = €5.5 billion gross annual revenue. We note that there may be some measurement error in this estimate due to some people interpreting the question about gambling spend as asking about net spend rather than gross spend, but it nonetheless provides a useful estimate, as outlined in the paragraphs to follow. The question about gambling spend was worded according to best practice in measuring gambling spend from previous literature (Wardle et al., 2011; Wood and Williams, 2007).

gambling is accounted for by the 3.3% of the population who have PG, while 47% of overall spend is accounted for by the 10.4% of adults who have either PG or show moderate evidence of PG. This pattern is largely repeated across online and in-person gambling, and across panels A, B and C (Tables A21–A23). Those with PG spent an average of €231 per week on gambling (median = €108), which equates to €12,000 a year (median = €5,800).[22] Over two-fifths (43%) of this was on in-person gambling (€99 per week) while 57% was on online gambling.[23] We have no reason to suspect that the relative contribution from each PG group (PG, moderate evidence, some evidence, no evidence) to total revenue in Ireland (estimated to be over €6 billion) differs from the proportions observed here.

These findings are worth considering in the context of the main measures of PG that we report. Suppose, for the sake of argument, that despite the efforts described above to check the validity of our results, the true level of PG is close to that estimated in the National Drug and Alcohol Survey (NDAS) and that PG in our sample is overestimated due to a very strong selection bias of people with PG into online panels. Given, firstly, that our calculation of aggregate expenditure is nevertheless below industry revenue and, secondly, that people with PG contribute a high proportion of reported spending, the implication would be that the gamblers without PG in our sample would need to be *greatly* under-reporting their expenditure. But the mean expenditure figure of €11 per week for those with no evidence of PG in Table 3.10 includes people who don't gamble at all, such that the figure for those who gamble but display no evidence of PG is €16 per week (€832 per year). To obtain spending equivalent to industry revenue, these individuals would have to be actually spending an average of €41 per week (over €2,000) per year. We think it is highly unlikely that non-problem gamblers would underestimate their spend to such an extent, or that the average gambler without PG is spending at this level. Yet the revenue has to come from somewhere.

22 When gambling with friends and family is included (Table A20), average spend per week is €260.

23 Of the in-person mean spend for those with PG of €99 per week, €29 per week (€1,500 per year) went on horse and dog betting, while €14 per week (€730 per year) went on sports betting.

TABLE 3.10 GAMBLING EXPENDITURE EXCLUDING GAMBLING BETWEEN FRIENDS – FULL SAMPLE INCLUDING THOSE WHO DIDN'T GAMBLE IN THE PREVIOUS 4 WEEKS

	Full sample	Problem gambling	Moderate evidence	Some evidence	No evidence
Prevalence	100.0	3.3	7.1	15.0	74.7
Mean spend – Total	27	231	70	42	11
Median spend – Total	7	108	35	21	4
% of overall spend – Total	100.0	28.3	18.4	23.3	30.0
Mean spend – In person	12	99	22	18	6
Median spend – In person	3	21	13	8	2
% of aggregate spend – In person	100.0	26.7	13.1	22.6	37.5
Mean spend – Online	15	132	47	23	5
Median spend – Online	0	65	17	6	0
% of aggregate spend – Online	100.0	29.6	22.8	23.8	23.8

Notes: Weighted estimates. Full sample N=2,850. Gambling between friends is excluded here as this does not constitute industry revenue and may not necessarily involve monetary exchanges.

TABLE 3.11 GAMBLING EXPENDITURE EXCLUDING GAMBLING BETWEEN FRIENDS – SAMPLE WHO GAMBLED IN THE PREVIOUS 4 WEEKS

	Full sample	Problem gambling	Moderate evidence	Some evidence	No evidence
Prevalence	100.0	4.3	9.0	18.9	67.9
Mean spend – Total	36	240	74	45	16
Median spend – Total	12	127	42	23	9
% of overall spend – Total	100.0	28.3	18.4	23.3	30.0
Mean spend – In person	16	103	24	20	9
Median spend – In person	6	21	15	9	5
% of aggregate spend – In person	100.0	26.7	13.1	22.6	37.5
Mean spend – Online	20	137	50	25	7
Median spend – Online	0	66	20	7	0
% of aggregate spend – Online	100.0	29.6	22.8	23.8	23.8

Notes: Weighted estimates. N=2,099 (all those who gambled in previous four weeks). Gambling between friends is excluded here as this does not constitute industry revenue and may not necessarily involve monetary exchanges.

Mean spend for men is €33 per week (median=€9), while for women it is lower at €21 per week (median=€6). Among those who have PG, mean spend is higher for women (€296, median=€130) than for men (€176, median=€106), though it is worth nothing that these estimates are likely to be quite imprecise due to the low sample size. It is also worth noting that the distribution of spending among those who gambled in the previous four weeks roughly follows the commonly observed Pareto rule, with 79% of total spend being accounted for by the top quartile of those who gambled (i.e., those at or above the 75th percentile), who have a mean weekly spend of €116.[24] A further 13% of total spend is accounted for by the third quartile (mean weekly spend of €20), while the bottom two quartiles account for only 8% of spending between them (mean for second quartile is €8 per week, for bottom quartile €3 per week).

[24] The Pareto rule is a common rule of thumb used in marketing and management that approximately 80% of outcomes can be attributed to approximately 20% of the population.

Table 3.12 repeats the analysis of Table 3.10, but focuses only on expenditure on lotteries and scratch cards. This is because the National Lottery is by far the biggest supplier in this part of the market and, in offering opportunities to gamble for good causes, represents a different business model to the gambling services offered by private for-profit gambling companies. People with PG do not account for such a large share of expenditure on lotteries and scratch cards as they do for gambling expenditure as a whole. Nevertheless, 17% of expenditure on lotteries and scratch cards comes from people with PG, a figure that rises to 29% when we add those showing moderate evidence of PG. Less than half of expenditure on lotteries and scratch cards is accounted for by people for whom there is no evidence of PG. Furthermore, lotteries and scratch cards account for one-fifth of the spending of those with PG.

TABLE 3.12 LOTTERY AND SCRATCH CARD EXPENDITURE

	Full sample	Problem gambling	Moderate evidence	Some evidence	No evidence
Prevalence	100.0	3.3	7.1	15.0	74.7
Mean spend – Total	9	46	15	13	6
Median spend – Total	4	16	10	10	3
% of overall spend – Total	100.0	17.1%	11.8%	22.6%	48.4%
Mean spend – In person	6	31	9	10	4
Median spend – In person	2	8	6	5	1
% of aggregate spend – In person	100.0	16.2%	10.6%	22.8%	50%
Mean spend – Online	2	15	5	4	1
Median spend – Online	0	0	0	0	0
% of aggregate spend – Online	100.0	19.5%	14.8%	22.4%	43.2%

Notes: Weighted estimates. Full sample N=2,850.

In terms of gambling frequency, as shown in Tables 3.13–3.16, the figures for online slot machines are striking. Almost one-quarter of people who spent money on online slot machines within the previous four weeks did so at least four to five times a week, and this proportion rose to almost one-half among those with PG. Among those with PG, horse and dog betting was the activity with the next highest frequency, with almost one-third of those spending money on this online doing so at least four to five times a week, with the corresponding figure for in-person betting being almost one-quarter. Scratch cards were also frequently played by those with PG who spend money on them, with one-quarter buying scratch cards in person at least four to five times a week, and the same proportion doing so online. It should be noted that the cell sizes for the analysis of gambling frequency among those with PG are small and thus the estimates carry a high degree of uncertainty. It should also be noted that seasonality may play a role in our gambling spend and frequency estimates in relation to sporting events, given that the data were collected between 21 August and 5 September 2023. For example, the

Galway Races Summer Festival at the beginning of August may have seen some people gamble more than usual on horse racing, while the lack of top-level competition in GAA and rugby may have seen some people bet less than usual on sports.

TABLE 3.13 FREQUENCY OF GAMBLING FOR THOSE WHO SPENT MONEY ON ONLINE GAMBLING IN THE PREVIOUS 4 WEEKS

	< Once a week	Once a week	2–3 times a week	4–5 times a week	Everyday/ almost everyday
Horse and dog betting	38.4	22.4	26.2	5.4	7.6
Sports betting	33.1	42.9	18.4	3.3	2.2
Lotteries	38.3	35.0	23.0	3.1	0.6
Scratch cards	50.7	31.9	12.2	1.2	3.9
Bingo	25.8	40.8	23.5	7.0	2.8
Slot machines	32.1	29.8	13.3	15.9	8.9
Casino gambling	43.8	24.8	21.1	2.6	7.7
Spread betting	65.7	16.5	12.0	3.4	2.5
Other	43.4	44.8	10.1	1.7	0.0

Notes: Weighted estimates. Percentages expressed as percentage of all those who spent money on a given activity in the previous 4 weeks.

TABLE 3.14 FREQUENCY OF GAMBLING FOR THOSE WHO SPENT MONEY ON IN-PERSON GAMBLING IN THE PREVIOUS 4 WEEKS

	< Once a week	Once a week	2–3 times a week	4–5 times a week	Everyday/ almost everyday
Horse and dog betting	51.1	31.3	11.0	4.3	2.3
Sports betting	47.7	39.8	10.2	0.7	1.6
Lotteries	40.5	40.1	17.0	2.0	0.4
Scratch cards	54.0	30.2	12.7	2.3	0.8
Bingo	40.5	38.3	18.4	2.8	0.0
Slot machines	72.4	19.0	8.5	0.0	0.0
Casino gambling	52.9	27.7	19.4	0.0	0.0
Friends	65.8	20.9	10.9	1.3	1.1
Other	40.1	30.6	29.3	0.0	0.0

Notes: Weighted estimates. Percentages expressed as percentage of all those who spent money on a given activity in the past four weeks.

TABLE 3.15 FREQUENCY OF GAMBLING FOR THOSE WITH PG WHO SPENT MONEY ON ONLINE GAMBLING IN THE PREVIOUS 4 WEEKS

	< Once a week	Once a week	2–3 times a week	4–5 times a week	Everyday/ almost everyday
Horse and dog betting	10.4	20.7	36.6	8.8	23.4
Sports betting	15.7	36.2	30.1	5.9	12.2
Lotteries	13.0	23.4	37.4	23.8	2.5
Scratch cards	11.2	32.2	31.7	5.7	19.2
Bingo	24.7	27.6	36.7	0.0	11.0
Slot machines	20.8	21.6	11.7	27.5	18.4
Casino gambling	36.0	20.0	40.5	0.0	3.5
Spread betting	43.2	7.3	34.9	14.6	0.0
Other	39.4	60.6	0.0	0.0	0.0

Notes: Weighted estimates. Percentages expressed as percentage of all those with PG who spent money on a given activity in the past four weeks. Most cell sizes are below 30, and so the estimates in this table carry a high degree of uncertainty.

TABLE 3.16 FREQUENCY OF GAMBLING FOR THOSE WITH PG WHO SPENT MONEY ON IN-PERSON GAMBLING IN THE PREVIOUS 4 WEEKS

	< Once a week	Once a week	2–3 times a week	4–5 times a week	Everyday/ almost everyday
Horse and dog betting	14.0	38.8	23.7	12.6	10.9
Sports betting	27.2	24.9	36.4	5.0	6.6
Lotteries	14.9	45.0	30.1	7.4	2.7
Scratch cards	4.3	36.1	32.3	19.5	7.7
Bingo	36.7	37.9	25.4	0.0	0.0
Slot machines	45.2	21.8	33.0	0.0	0.0
Casino gambling	9.6	45.0	45.3	0.0	0.0
Gambling between friends	21.4	38.7	27.1	4.9	7.9
Other	51.2	0.0	48.8	0.0	0.0

Notes: Weighted estimates. Percentages expressed as percentage of all those with PG who spent money on a given activity in the past four weeks. Most cell sizes are below 30, and so the estimates in this table carry a high degree of uncertainty.

3.4 SOCIODEMOGRAPHIC ANALYSIS OF PROBLEM GAMBLING

In this section we assess the sociodemographic composition of PG in Ireland, by age, gender and educational attainment. We first present a descriptive analysis, followed by a regression analysis where we test for statistically significant associations. We focus only on gender, age and education – comparisons by other characteristics (e.g., rural vs. urban) will feature in subsequent reports. Tables 3.17 and 3.18 show the prevalence of PG within sociodemographic subgroups, and the sociodemographic composition of each PGSI category, respectively. While more men than women had PG, the gender split of 55:45 is more even than that suggested by previous international research, which finds a strong association between being male and PG (Ó Ceallaigh et al., 2023). Indeed, the previous Irish

estimates of PG using 2019 data found that the vast majority of those with PG were male (Mongan et al., 2022), while Irish healthcare treatment reporting system data show the same pattern (Condron et al., 2022; Kelleher and Lynch, 2023). In the Mongan et al. (2022) study, PG prevalence among males was estimated to be 0.6%, compared to 3.6% in our study, while for females it was estimated at 0.03%, compared to 2.9% in our study. Therefore, while the PG estimate for men is six times higher in our study than in the Mongan et al. (2022) study, it is many more times higher for women.

Estimates of PG in the UK for the year to March 2023 mirror our findings on the gender split in PG, however, in that PG rates are higher among men, but not by much. Year-on-year UK data show that there has been a convergence in PG rates between men and women over the past few years (UK Gambling Commission, 2023). The difference between our findings and the Mongan et al. (2022) data from 2019 may be partly due to the time gap between the two data collection periods. The treatment report system data analysed by Condron et al. (2022) and Kelleher and Lynch (2023) are more recent, however, so the discrepancy between our findings and theirs cannot be explained by time. It is possible that PG among women remains more hidden, that women and men answer the PGSI differently, or that PG among men is more likely to lead to additional difficulties for families, and that these, or some other differences, mean that men are more likely to either self-refer or be sent for treatment. There is also the possibility that differences in selection into online panels between men and women may play a role, but as noted in Chapter 2, we took several measures to mitigate the risk of any such selection effects playing an important role in our sample.

TABLE 3.17 PREVALENCE OF PROBLEM GAMBLING AMONG SOCIODEMOGRAPHIC SUBGROUPS

	Problem gambling prevalence (%)
Male	3.6
Female	2.9
Under 30 years	4.3
30–39 years	6.7
40–49 years	4.1
50–59 years	1.8
60–69 years	0.7
70+ years	0.5
Less than Leaving Certificate	1.5
Leaving Certificate	4.4
Tertiary education but less than a degree	4.1
Degree or higher	2.6

Notes: Weighted estimates. N=2,850.

TABLE 3.18 SOCIODEMOGRAPHIC COMPOSITION OF EACH PGSI CATEGORY

	Full sample (%)	Problem gambling (%)	Moderate evidence (%)	Some evidence (%)	Any evidence (%)	No evidence (%)
Female	51.0	45.5	33.2	44.1	41.2	54.3
Male	49.0	54.5	66.8	55.9	58.8	45.7
Under 30 years	18.4	24.3	27.9	22.8	24.5	16.4
30–39 years	18.1	37.2	19.6	20.3	22.3	16.6
40–49 years	19.9	24.8	19.6	21.9	21.6	19.3
50–59 years	16.7	8.9	18.2	15.1	15.2	17.2
60–69 years	13.3	2.8	8.0	9.6	8.3	14.9
70+ years	13.7	2.1	6.7	10.3	8.2	15.6
Less than Leaving Certificate	15.8	7.2	16.6	18.3	16.4	15.6
Leaving Certificate	21.6	28.7	22.5	22.1	23.1	21.2
Tertiary less than a degree	31.9	40.0	33.7	28.8	31.6	32.0
Degree or higher	30.7	24.1	27.3	30.9	29.0	31.2

Note: Weighted estimates. Full sample N=2,850. The 'Any evidence' group includes all those in the PG, moderate evidence and some evidence groups.

The distribution of those with PG across age groups is uneven, with much higher prevalence in the under 50 age groups than in the over 50 groups. This tallies with previous research showing that PG is negatively associated with age (Ó Ceallaigh et al., 2023), and mirrors recent findings from the UK (UK Gambling Commission, 2023). The 30–39 age group has the highest estimated prevalence at 6.7%. An open question is whether the relationship between age and PG is driven by an age effect

or a cohort effect. If it is driven by an age effect (simply being older is protective against PG), then we would expect to see the same patterns across age groups in ten years' time, all other things being equal. If, however, it is driven by the increased susceptibility of current younger adults to PG (for example, due to increased exposure to online gambling during formative years), then we might be observing a cohort effect. If so, were we to repeat this study in ten years' time, we would see a higher prevalence of PG among 50–59 year olds, as the individuals with PG in the 40–49 bracket move into this older category and continue their gambling behaviours. This distinction between an age effect and a cohort effect is important, as a cohort effect would imply that the overall prevalence of PG is likely to rise in years to come.

When looking at educational attainment, the highest prevalence of PG is among those for whom the Leaving Certificate, or tertiary qualification below degree level, is their highest level. Higher prevalence among these groups than in the 'degree or higher' group is in line with previous research that records a negative relationship between educational attainment and PG. However, the lowest prevalence among all groups is found among those who did not obtain a Leaving Certificate. This is less out of step than it would initially appear, however, because those in this group in Ireland are primarily older – three-quarters of them are over 50 (CSO, 2023b) – due to intergenerational differences in educational attainment.

Table 3.19 shows the result of a regression of PG on gender, age and education. This regression largely confirms the findings from the descriptive analysis. We see that being female is negatively associated with having PG, but this association is only marginally significant. Relative to being aged 50–59 years, being under 50 is positively significantly associated with PG. Relative to having at least a degree, having only a Leaving Certificate, or having at most a tertiary education less than a degree, are positively associated with PG.

TABLE 3.19 LOGIT REGRESSION OF PG ON SOCIODEMOGRAPHIC VARIABLES – COEFFICIENTS REPORTED AS ODDS RATIOS

	Problem gambling
Female	0.655* [0.425,1.009]
Age ('50–59 years' as reference category)	
Under 30 years	2.259** [1.000,5.104]
30–39 years	3.366*** [1.689,6.709]
40–49 years	2.218** [1.089,4.518]
60–69 years	0.443 [0.154,1.280]
70+ years	0.187 [0.024,1.435]
Educational attainment ('degree or higher' as reference category)	
Less than Leaving Certificate	0.935 [0.274,3.186]
Leaving Certificate	2.445*** [1.410,4.239]
Tertiary education but less than a degree	1.873** [1.096,3.203]
Dependent variable mean	0.033
N	2,850

Notes: Exponentiated coefficients (odds ratios); 95% confidence intervals in brackets. *p<0.10; **p<0.05; ***p<0.01.

3.5 PERCEPTIONS AND ATTITUDES ABOUT GAMBLING

Participants were also asked to estimate their position in the gambling spend distribution for adults.[25] The expenditure data collected as part of the survey allowed us to compare each participant's actual position in the spend distribution to this perception. As can be seen in Table 3.20, on average, individuals in our sample underestimated their position in the gambling spend distribution for adults in Ireland by nine percentiles. In other words, participants underestimated by nine percentage points the percentage of adults in Ireland who spent the same as, or less than, themselves on gambling over the previous four weeks. However, there

[25] Adapting a technique developed by Robertson et al. (2023) and based on best practices for communicating statistics, participants were presented with a grid of 100 figures representing adults, and were asked to select the number of 100 adults they believed spent more money on gambling than they themselves had spent over the previous four weeks.

is considerable variation in this misperception between PGSI categories. Mean underestimation is 40 percentiles for those with PG, 26 percentiles for those in the 'moderate evidence' category, 21 percentiles for those in the 'some evidence' category, and just 2 percentiles for those in the 'no evidence' category. Those with PG perceive themselves, on average, to be in the middle of the distribution (50th percentile) when in fact they lie at the 90th percentile on average. In short, people perceive that the proportion of others who spend more than them on gambling is larger than it truly is, a misperception that worsens with the severity of a person's PG.

TABLE 3.20 DIFFERENCE BETWEEN ACTUAL AND PERCEIVED POSITION IN GAMBLING SPEND DISTRIBUTION

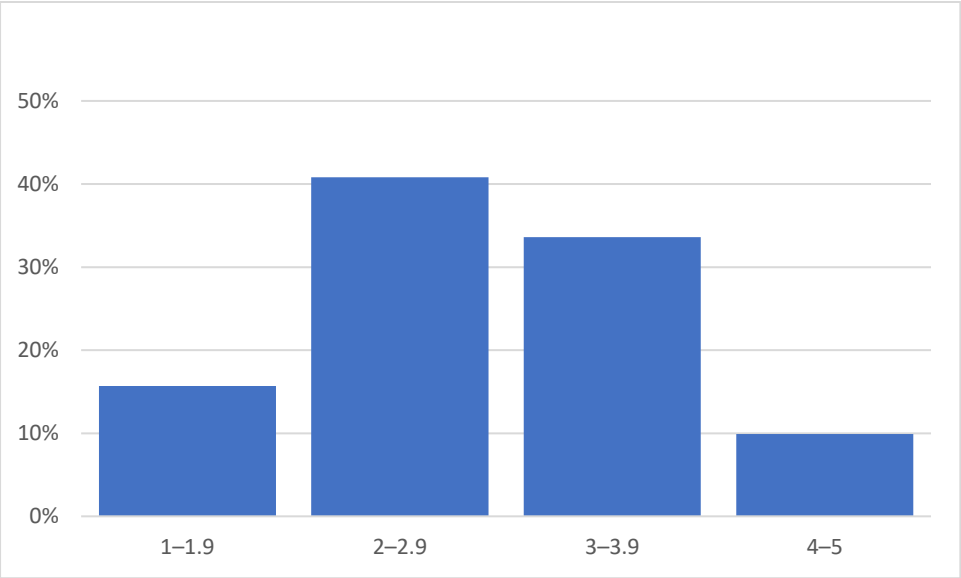
	Mean under-estimation (percentiles)	Lower CI (percentiles)	Upper CI (percentiles)
Full sample	8.8	7.3	10.3
Problem gambling	40.3	34.2	46.4
Moderate evidence	26.0	21.8	30.3
Some evidence	21.2	17.8	24.5
No evidence	2.1	0.4	3.8

Notes: Full sample N=1,884 (panel C did not complete this task). CI=Confidence interval.

Figure 3.1 depicts the distribution of our aggregate measure of stigma towards PG. Note that we measure stigma towards people with PG and not stigma or discrimination experienced by those with PG. When asked to rate on a scale of one (very uncomfortable) to five (very comfortable) how comfortable participants would be in a number of different social interactions with a person with PG,[26] the majority (57%) give an average rating of two to three, implying at least some discomfort, while more than one-quarter score above three. It is worth noting when interpreting these findings that how people represent a 'problem gambler' is likely to influence their response to these questions. Further research is required to investigate the public's conceptualisation of a problem gambler, but these findings at least point to it being broadly negative. See Figures A1–A3 for overall stigma among those with PG, those who gamble and don't have PG, and those who don't gamble. Stigma is highest among those with PG, and lowest among those who don't gamble.

[26] The situations were: (i) moving next door to; (ii) making friends with; (iii) spending an evening socialising with; (iv) starting working closely with a person who has a problem with gambling; (v) having a treatment centre for people with problems with gambling in their local area; and (vi) having a person who has a problem with gambling marry into the respondent's family.

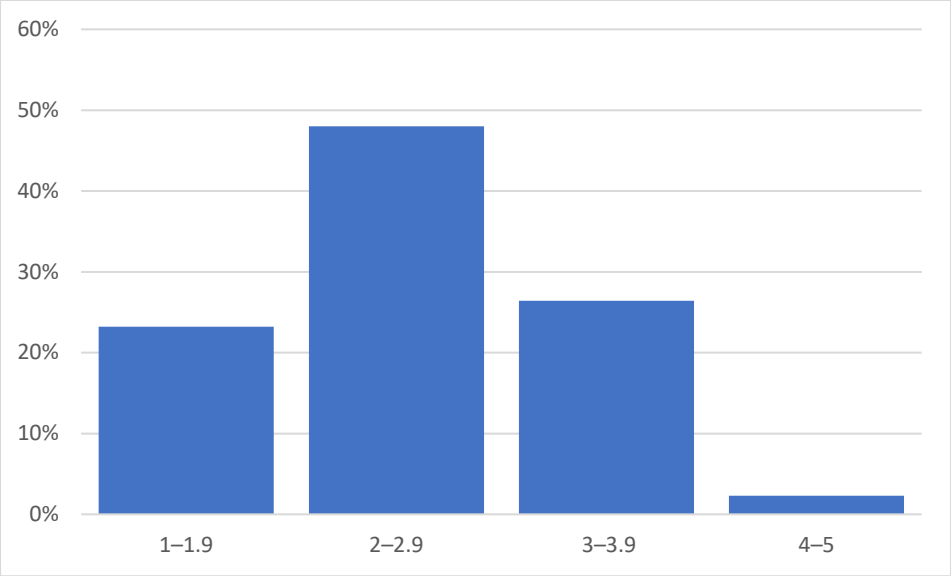
FIGURE 3.1 STIGMA SCALE SCORE



Notes: Weighted estimates. N=1,884. The higher the score on the five-point stigma scale, the higher the level of stigma.

Figure 3.2 shows that a strong majority (71%) of individuals expressed an overall negative attitude towards gambling (i.e., scored less than three overall on the Attitudes Towards Gambling Scale). This is in line with previous studies internationally using this scale, which mostly find a negative attitude towards gambling (Hellumbråten Kristensen et al., 2022). See Figures A4–A6 for overall attitudes among those with PG, those who gambled and don't have PG, and those who didn't gamble. The most negative attitudes are held by those who don't gamble. An examination of results for the individual items on this scale gives some additional insight (Figure 3.3). Almost four-fifths (79%) of participants agree that, 'there are too many opportunities for gambling nowadays'. Over half (51%) agree that, 'gambling should be discouraged', with only 14% disagreeing. Two-thirds (67%) agree that, 'gambling is dangerous for family life'. Only 7% agree that, 'on balance, gambling is good for society', and only 17% agree that, 'Gambling livens up life'. Finally, less than half disagree that, 'It would be better if gambling was banned altogether', which one might judge as a low proportion given the extremeness of such a proposal.

FIGURE 3.2 ATTITUDES TOWARDS GAMBLING SCALE – DISTRIBUTION OF OVERALL SCORES



Notes: Weighted estimates. N=1,884. A higher score on the five-point scale means a more positive attitude towards gambling.

FIGURE 3.3 ATTITUDES TOWARDS GAMBLING SCALE – DISTRIBUTIONS OF SCORES FOR INDIVIDUAL ITEMS

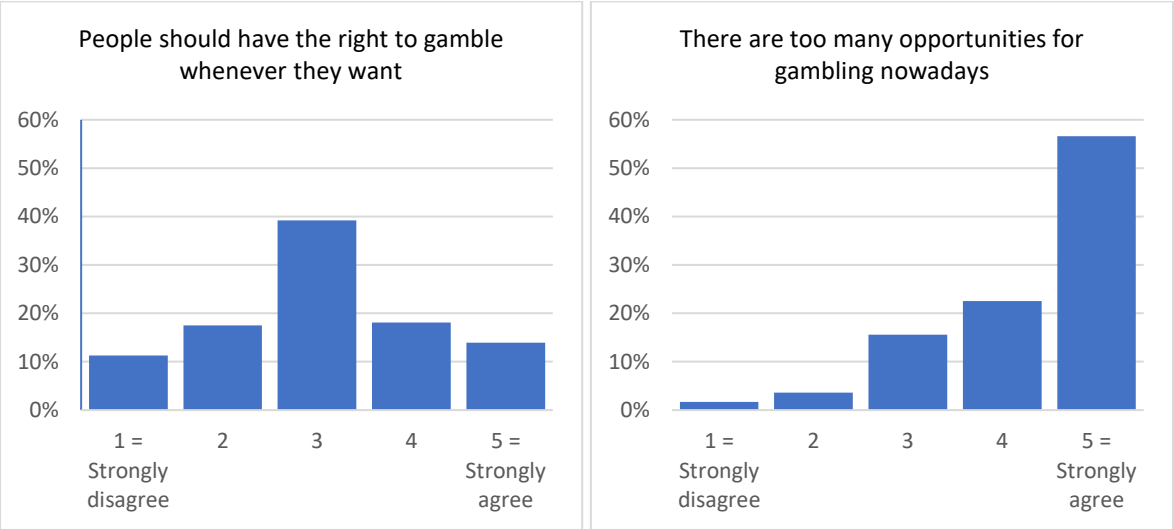
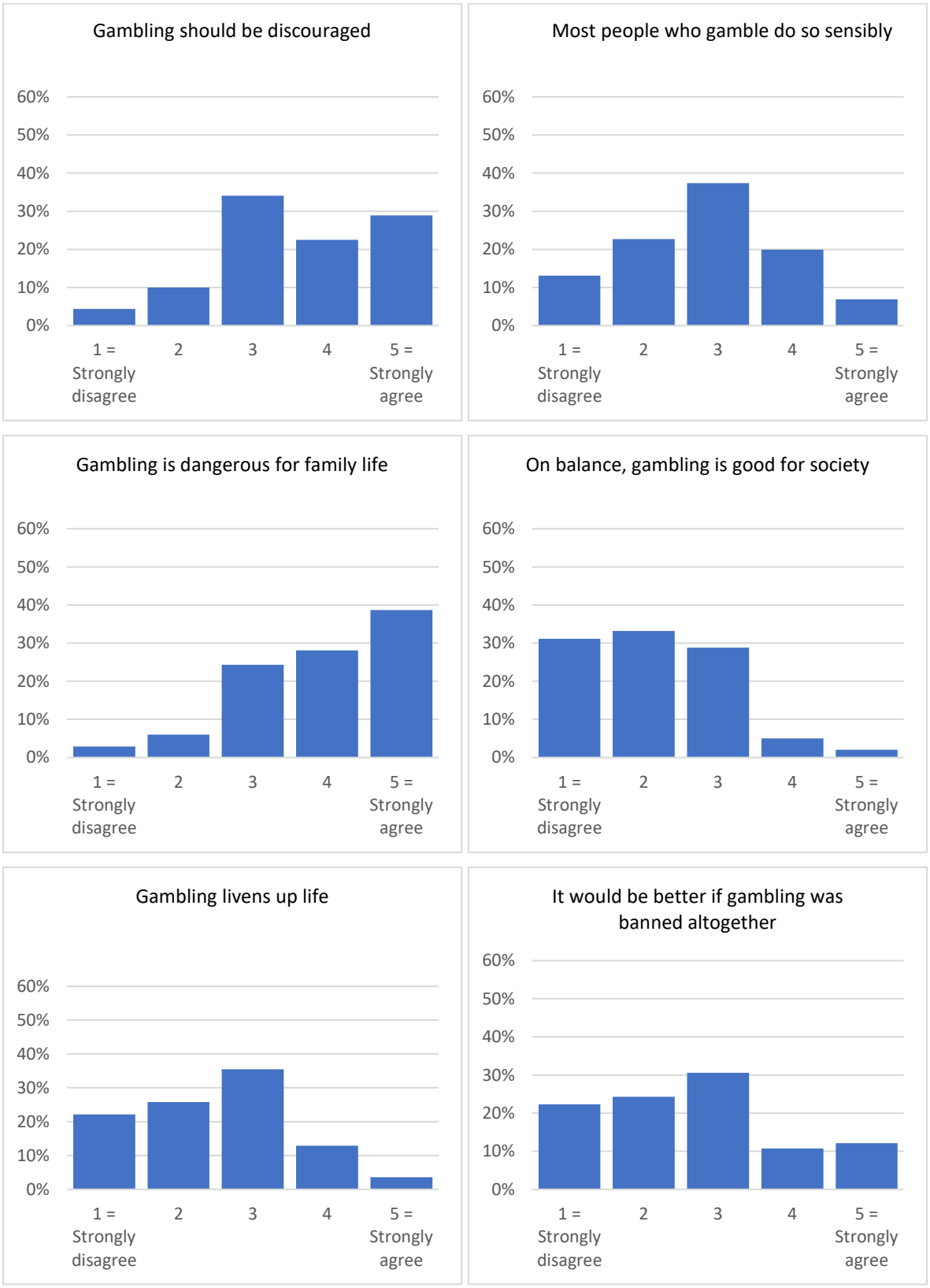


FIGURE 3.3 (CONTD.) ATTITUDES TOWARDS GAMBLING SCALE – DISTRIBUTIONS OF SCORES FOR INDIVIDUAL ITEMS



Notes: Weighted estimates. N=1,884.

When asked what they think about their current level of gambling, 9% of gamblers say they would like to gamble less, compared to 2% who say they would like to gamble more (see Table 3.21). Among those with moderate evidence of PG, the percentage who would like to gamble less rises to 28%, while 67% of those with PG say they would like to gamble less than they currently do. The implication of these numbers is that for most people with PG and many who show moderate evidence of PG, the current gambling landscape may be inducing self-control failures; they would like to pursue a longer-term goal of gambling less but on a day-to-day basis struggle to limit their gambling. Almost one-third of those with PG are happy with their current level of gambling, with very few (3%) who would like to gamble more. According to the stages of change in addiction model (Prochaska and DiClemente, 1983), such individuals are at the first stage of the change process (precontemplation) and are not currently considering a change to reduce their gambling behaviour. This heterogeneity in stage of change across those with PG needs to be taken account of when considering policies and interventions for PG.

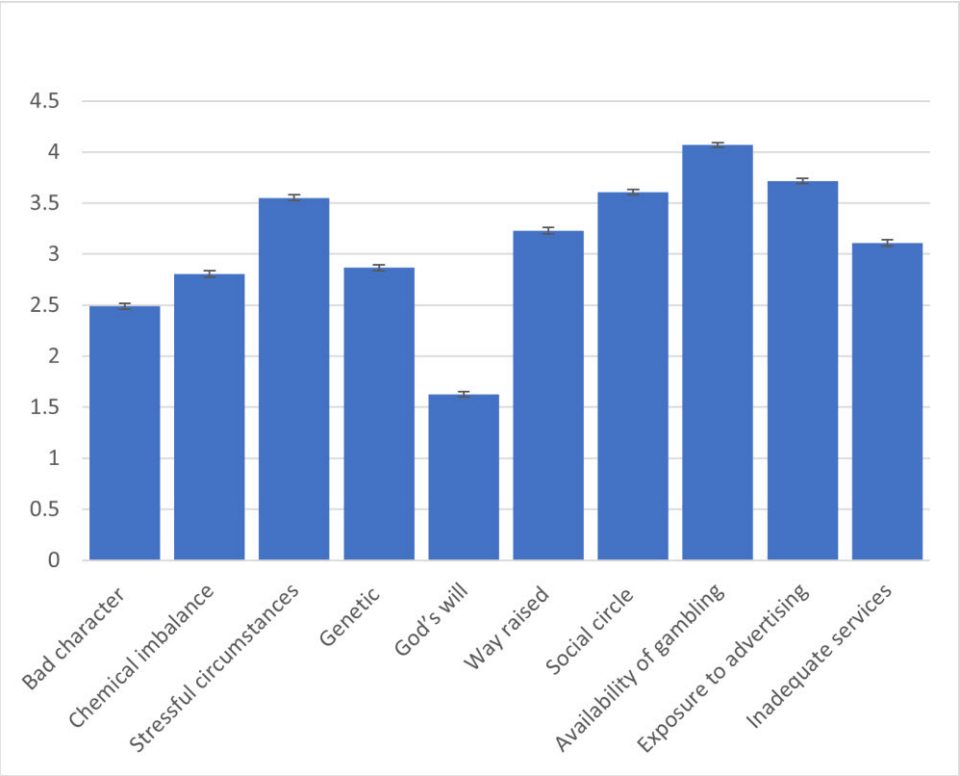
TABLE 3.21 RESPONSES TO THE QUESTION, 'WHAT DO YOU THINK ABOUT YOUR OWN CURRENT LEVEL OF GAMBLING?'

	Would like to gamble less (%)	Happy with current level of gambling (%)	Would like to gamble more (%)	p-value, difference between 'less' and 'more'
Full sample	7.5	90.2	2.3	0.000
Gambled in previous 4 weeks	8.7	88.9	2.4	0.000
Some evidence of PG	6.4	90.5	3.1	0.087
Moderate evidence of PG	28.1	65.5	6.4	0.000
Have problem gambling	67.0	29.9	3.1	0.000

Notes: Weighted estimates. Full sample N=1,884.

When participants were asked what they thought caused a person's gambling problems, out of ten different possible causes, 'the widespread availability of opportunities to gamble' was perceived as the most likely cause, followed by 'exposure to advertising and promotion of gambling' (Figure 3.4). Both were given statistically significantly higher likelihood ratings than all other possible causes listed. The patterns are largely similar for the subgroups of individuals with PG, those who gamble but don't have PG, and those who don't gamble (see Figures A7—Figure A9 in the appendix).

FIGURE 3.4 PERCEIVED LIKELIHOOD OF VARIOUS FACTORS CAUSING PG – MEAN SCORES



Notes: Weighted estimates. N= 1,884. A higher score on the five-point scale means a higher perceived likelihood that a given factor causes PG. 95% confidence intervals shown.

Looking at the distribution of scores for individual factors in Figure 3.5, only 7% and 13% of participants thought that the availability of gambling and advertising, respectively, were unlikely to be causes of PG (compared to 75% and 62% who believed they were *likely* causes). It is interesting to note that these two supply-side factors were perceived as more likely causes of PG than any of the other causes listed, which included individual, social and health system factors. Of these other causes, 'stressful circumstances in their life' and 'the people they socialise with' were rated as the most likely causes (rated as likely by 53% and 56%, respectively). This difference – between identification of structural causes of PG and individual-level ones – may be a signal of the kind of support the public would hold towards different types of policy response.

FIGURE 3.5 DISTRIBUTION OF LIKELIHOOD SCORES FOR EACH POSSIBLE CAUSE OF PG ANALYSED

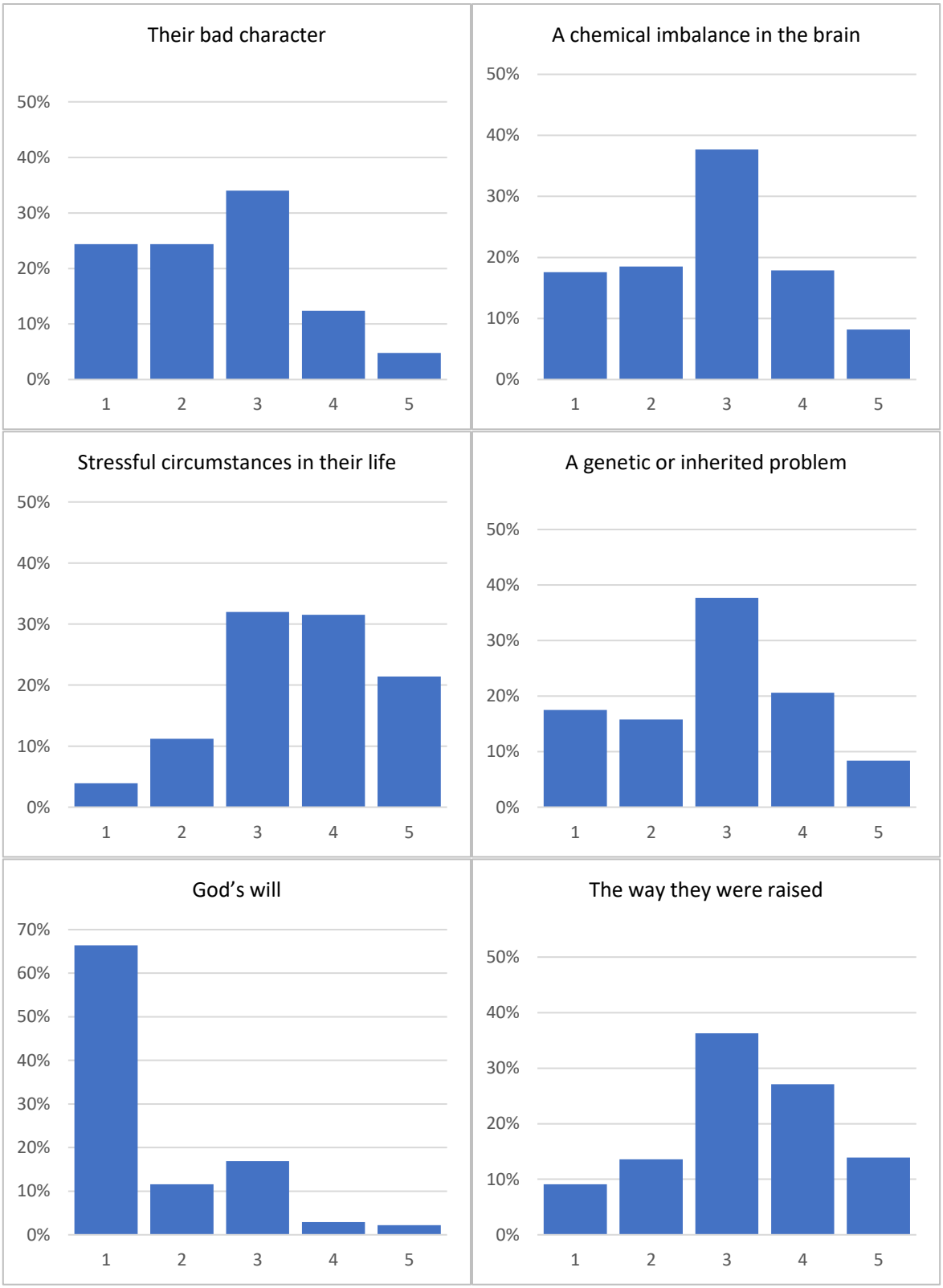
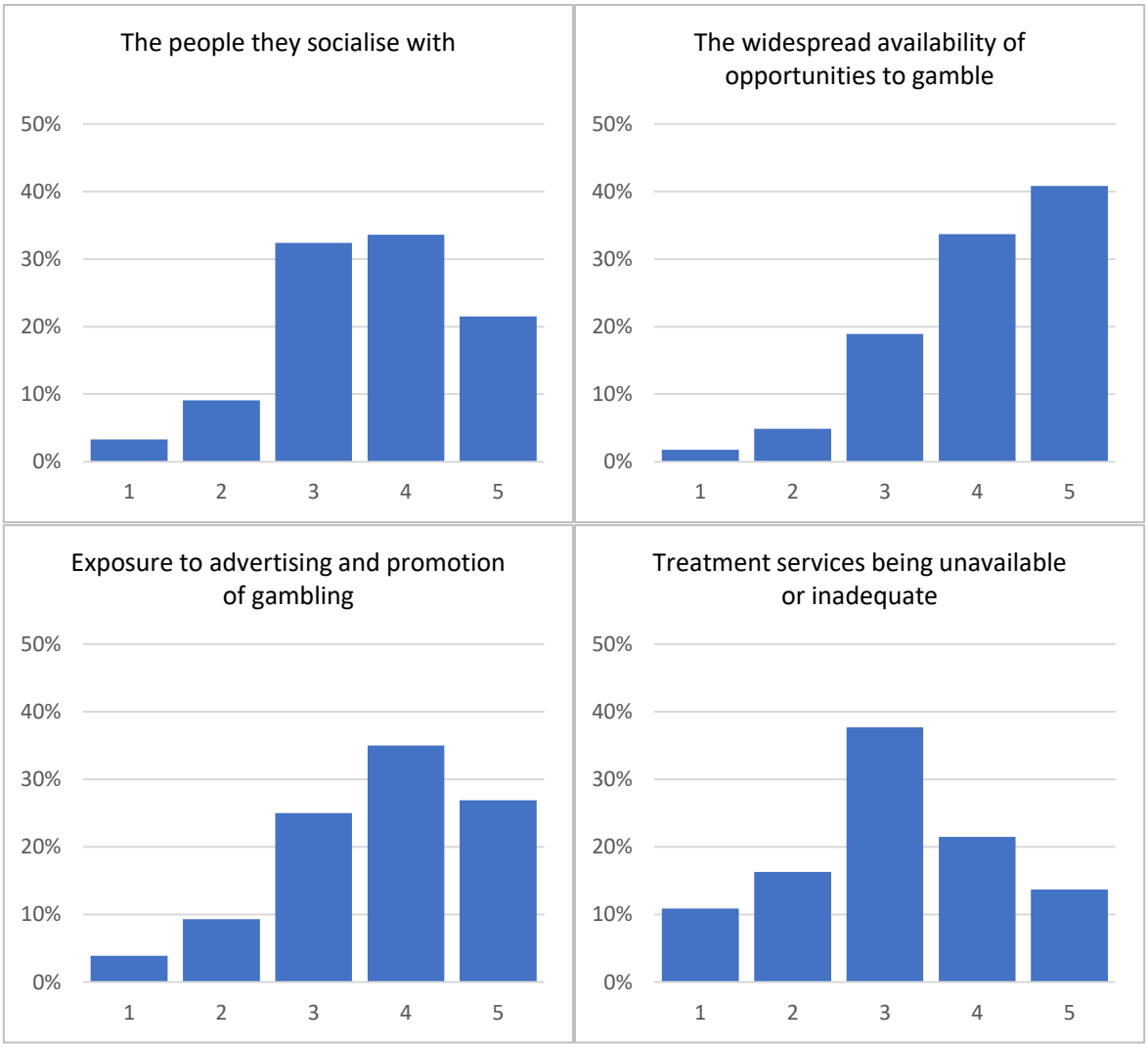


FIGURE 3.5 (CONTD.) DISTRIBUTION OF LIKELIHOOD SCORES FOR EACH POSSIBLE CAUSE OF PG ANALYSED



Notes: Weighted estimates. N=1,884. The y-axis presents the percentage of participants. The x-axis denotes the response, where one was labelled 'very unlikely' and five was labelled 'very likely'.

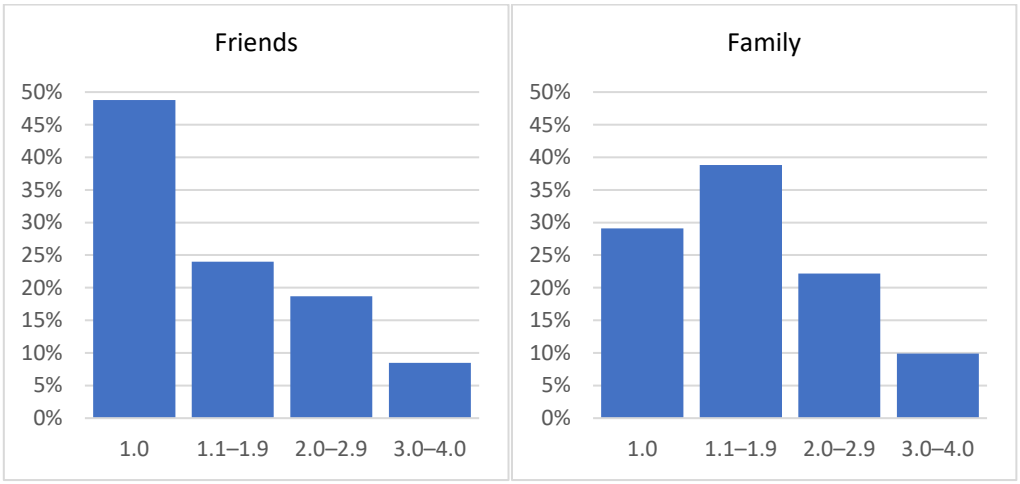
3.6 FAMILY EFFECTS AND MENTAL HEALTH

Participants with a friend or family member who gambles were asked how often they had experienced six different problems over the previous three months as a result of the gambling of a friend or family member.[27] Responses across the six problems were averaged, with a score above one indicating at least one problem was experienced in the previous three months. Approximately one-fifth of individuals who had a friend with PG scored between two (rarely) and three (sometimes) on average, while one-tenth scored between three (sometimes) and

[27] The problems were: financial hardship; feelings of sadness, anxiety, stress or anger; quality of relationship was affected; social life was affected; ability to work or study was affected; and physical health was affected.

four (often) (Figure 3.6). The patterns are almost identical for those who had a family member with PG.

FIGURE 3.6 PROBLEM GAMBLING SIGNIFICANT OTHER IMPACT SCALE SCORES FOR THOSE WHO HAVE A FRIEND WITH PG, AND FOR THOSE WHO HAVE A FAMILY MEMBER WITH PG



Notes: Weighted estimates. N=249 for friends, N=253 for family. Responses were scored such that '1' indicated a 'not at all' response, 2 indicated 'rarely', 3 indicated 'sometimes' and 4 indicated 'often'.

Having PG is significantly associated with poorer mental health (see Ó Ceallaigh et al., 2023). Ordinary least square (OLS) regressions with standardised mental health – measured with the Mental Health Inventory-5 (MHI-5) – as the dependent variable confirm this, showing that, when compared to the rest of the sample, having PG is associated with a score that is lower by 0.83 standard deviations (Table 3.22, column 1). When compared to those who show no evidence of PG (column 2), the score for those with PG is lower by 0.92 standard deviations, while the score for those with moderate and some evidence of PG is lower by 0.49 and 0.27 standard deviations, respectively. Having a family member with PG is also associated with poorer mental health of 0.39 standard deviations, close to exactly half the size of the coefficient estimate in the first regression. These effects are large and highly statistically significant, but it is important to bear in mind that this does not mean that the individual's mental health problems are caused by PG (although they could be), since it is possible that those with worse mental health are more inclined to engage in PG. The findings demonstrate an association between the two, not its cause. Having a friend with PG is not significantly associated with poorer mental health.

TABLE 3.22 OLS REGRESSION OF ASSOCIATION BETWEEN MENTAL HEALTH AND PG, HAVING A FRIEND WITH PG AND HAVING A FAMILY MEMBER WITH PG

	(1) Mental health	(2) Mental health	(4) Mental health	(3) Mental health
PG	-0.832*** [-1.036,-0.629]	-0.920*** [-1.123,-0.718]		
Moderate evidence of PG		-0.489*** [-0.630,-0.348]		
Some evidence of PG		-0.266*** [-0.366,-0.166]		
Friend PG			0.010 [-0.122,0.141]	
Family PG				-0.335*** [-0.462,-0.207]
N	2,850	2,850	2,763	2,763

Note: 95% confidence intervals in brackets. Dependent variable (MHI-5 mental health score) is standardised. All regressions control for gender, age and education. Regression in column 1 includes as independent variable an indicator for having PG. Regression in column 2 includes indicator for PG, as well as an indicator for having moderate evidence of PG and some evidence of PG. Regressions in columns 3 and 4 exclude people who themselves have PG, and include an indicator for having a friend with PG and having a family member with PG, respectively. *p<0.10, **p<0.05, ***p<0.01.

CHAPTER 4
Conclusions and policy implications

4.1 SUMMARY OF FINDINGS

4.1.1 Main measures of problem gambling

Our estimates imply that the level of problem gambling (PG) in Ireland is much higher than previously thought. Our primary point estimate is based on a pre-registered measurement method that used the internationally recognised Problem Gambling Severity Index (PGSI) scale with a sample of almost 3,000 Irish adults (aged 18 years and over). We record that 3.3% of the adult population have PG (with a 95% confidence interval of 2.5–4.0%). This main estimate equates to 1 in 30 adults, or to 130,000 people, with PG in Ireland (confidence interval: 98,000–157,000).

This is more than ten times the previous estimate arising from a face-to-face survey that used the PGSI, as part of the 2019–2020 Irish National Drug and Alcohol Survey (NDAS) (Mongan et al., 2022). To some extent, the disparity between the figures could indicate a genuine increase in gambling behaviour over a four-year period that spanned a global pandemic. International evidence indeed suggests that problematic gambling increased during the pandemic (Forsström et al., 2023; Hodgins and Stevens, 2021). However, consistent with similar results in other countries as described in earlier chapters, the bulk of the disparity is likely to be due to different research methods being used. Answering the survey questions privately, and online, affords greater anonymity and results in more individuals being willing to admit problematic gambling behaviour.

In addition to the 3.3% that meet the PG criteria, we record a further 7.1% (confidence interval: 6.0–8.2%) of the adult population who show moderate evidence of PG. To meet these criteria, someone must still have multiple negative behaviours or experiences associated with their gambling. This equates to 279,000 people. Lastly, we record another 15% (confidence interval: 13.4–16.5%), or 590,000, who report at least some problematic experiences or behaviours. The proportions measured in these two additional categories are also substantially higher than previous estimates based on face-to-face surveys. Three-quarters (75%) show no evidence of PG. Among the full sample, 74% had gambled in the previous four weeks.

We performed multiple robustness checks on our main estimates. Our results are not sensitive to how we apply sociodemographic weights. Neither are they

sensitive to reweighting based on behavioural variables benchmarked against probability samples (smoking, online shopping and radio listening).

We believe it is unlikely that our study is over-reporting gambling behaviour, because our estimate of total spending on gambling falls below estimates of total industry revenue. By aggregating the self-reported expenditure on gambling among our sample, we generate an estimate of total annual spending of €5.5 billion. This compares with a conservative estimate of industry revenue at €6–8 billion (see Section 1.3). Is it possible that we have overestimated PG and simultaneously underestimated expenditure? We see no reason why participants might generally over-report gambling behaviour while simultaneously under-reporting gambling expenditure on those same behaviours. An alternative logical possibility is that we observe a combination of people with PG disproportionately selecting into online panels, inflating the estimate of PG, while people without PG under-report their spending. However, because people with PG and people who show moderate evidence of PG account for almost half of total gambling expenditure in our sample, the gamblers without PG in our sample would have to have very greatly under-reported expenditure – their true expenditure would need to be well over double what they revealed (see Section 3.3). Overall, therefore, we view the relationship between our expenditure data and industry revenue figures as providing confidence in our main estimates.

It is notable also how close our main estimate of PG is to the figure derived by deploying the Network Scale-Up Method (NSUM) to a question about whether close friends have a problem with their gambling. The PGSI relies on scores of an index, while our NSUM question relied simply on perceptions of a friend's gambling behaviour. Yet this latter method produced a figure of 3.2%, while the estimate for close family members was 2.4%. The figure for family members could be expected to be somewhat lower, because we did not ask participants to limit their consideration to family members aged 18 and over. Overall, therefore, our estimates of the prevalence of PG are in line with perceptions among the public at large about the extent of PG in their social networks. This is another helpful sense check on the validity of the data. Note that to explain these results as the product of sample selection would require not only that people with PG are many times more likely than the rest of the population to join online panels, but also that people who have friends with PG are very much more likely to join online panels. While logically possible, we see no reason or evidence for why this might be the case.

There nevertheless remains some uncertainty about the precision of the main estimates. We obtained a lower main figure of 1.2% from one of the three online panels that we used to collect the data. While this estimate is still four times higher than the previous measure, it is significantly below the figures arising from the

other two panels (4.1% and 4.4%). The difference may be driven by differences in incentive structures, as the lowest estimate was derived from the unpaid panel. Further investigations, however, revealed that the sample from that panel had a stronger over-representation of participants with high educational attainment, which would be likely to bias the resulting estimate of PG downwards. The panel also consisted of subscribers who were more used to participating in opinion polls than in research studies. Participants from this panel were much more likely than those from the other panels to drop out during the survey. Almost half of dropouts occurred early in the study, during the information page, which explained that the survey was about gambling behaviours, or before the first question. The larger dropout may be due to the difference between this survey and the shorter opinion polls they are more used to completing. This, in particular, is likely to have deflated the main estimate, if problem gamblers were more likely to drop out than other participants. Higher dropout among people with PG would be expected, as people who gambled more would require longer to complete the survey and might, in some cases, have experienced discomfort when asked to describe their gambling behaviour.

It nevertheless remains logically possible that the lower estimate arising from this one panel is more accurate than the estimates arising from the other two. In theory, a difference could result from sample selection effects, if people with PG happened to be very much more likely to take part in online studies in return for small payments, rather than to contribute to charitable donations. However, we view this as an unlikely explanation for the lower estimate. One reason is that the earnings panellists make are very low; the average panellist completes between 1.5 and 2.5 surveys per month. Moreover, in addition to the disparity in educational attainment and dropout rates, which would be expected to bias measures for this panel downwards, the expenditure data suggest that the two panels with higher estimates were more accurate, at €6.6 billion. Since we cannot completely rule out sample selection effects, in reporting a headline prevalence of 3.3% for PG, based on treating all three panels equivalently, we are taking a cautious approach and following the pre-registered analysis plan.

Unfortunately, even though our estimates are much higher than previous ones, we may still be underestimating the true prevalence of PG. This is because of social desirability bias – participants' tendency to answer questions in ways they believe will be viewed favourably by others. We anticipated that the additional anonymity afforded by online data collection, compared to in-person interviewing, would lead more people to overcome social desirability bias and, therefore, to be more honest in reporting their gambling behaviour. However, when we used the crosswise model technique to give survey participants even greater anonymity when answering one of the nine questions from the PGSI scale, the proportion of positive responses increased significantly. This needs to be interpreted carefully, as it

relates to one specific PGSI question and the complexities of the question format mean that estimates derived from the crosswise model can be imprecise. However, the effect is highly statistically significant and suggests that online data collection does not entirely overcome social desirability bias. Moreover, our tests of social desirability bias are only appropriate for investigating whether participants conceal their behaviour from others, and not other related survey biases such as self-denial. As such, our estimates of PG based on online self-reports may still be too low.

Unsurprisingly, people with PG report spending much more on gambling products than other gamblers. The mean reported spend among people with PG was €231 per week, or €12,000 per year. Obviously, this is a very high expenditure relative to disposable income. Weekly spend was €70 among those with moderate evidence of PG, €42 among those with some evidence and €11 for other gamblers. The conclusion is that while we recorded only 3.3% of the adult population as having PG, this group accounts for an estimated 28% of spending on gambling, with 47% of total spending accounted for by a combination of people with PG and those with moderate evidence of PG. We estimate that gamblers who report no evidence of PG on the PGSI scale contribute 30% of spending. When the analysis is limited to lotteries and scratch cards, while the proportion of spending accounted for by people with PG reduces, it remains a substantive 17%, and 29% when those showing moderate evidence of PG are included.

Relative to other gamblers, people with PG are more inclined to undertake all types of gambling (in person and online; racing, sports, bingo, lotteries and scratch cards), but the difference is more pronounced for casinos and slot machines. What distinguishes people with PG more, however, is the much higher frequency of gambling and higher spending on gambling products, although people with PG are particularly frequent users of online slot machines.

This report began by highlighting how difficult it is to measure the prevalence of PG. However, overall, our main estimates of PG constitute an obvious cause for concern. Despite residual issues surrounding their precision, the primary implication of the main measures that we report is that the prevalence of problematic gambling behaviours is likely to be an order of magnitude greater than implied by previous estimates.

4.1.2 Secondary research questions

The associations that we observe between PG and sociodemographic background characteristics are broadly in line with previous research. We find that PG is associated with being under 50 years of age, and with lower educational attainment. However, although men have a higher rate of PG than women, the

gender gap is smaller than anticipated based on previous work, and is not significant. Our estimate of the proportion of women with PG is 2.9%.

The age breakdown is also interesting. We find a high proportion of people with PG (above 4%) among all age groups under 50 years, with the highest proportion among the 30–39 age group. There is a sharp drop-off in PG after age 50. Based on this cross-sectional data, we cannot know whether this is an age effect or a cohort effect; i.e., whether the current cohort of 30–49 year olds will gamble less in their fifties, or whether they belong to a cohort that will continue to gamble more than its predecessors as they age. This is an important issue for future research, because if we are observing a cohort effect, the overall level of PG is likely to rise in coming years unless something substantive changes in the pattern of gambling behaviour.

PG is more prevalent among those with lower levels of educational attainment. However, it is important to note that our main estimate of PG is as high as 2.6% among those who are educated to degree level or higher.

When we asked participants to estimate the proportion of adults who spend more on gambling than they themselves do, gamblers were, on average, inclined to overestimate the proportion spending more. This was particularly true of people with PG. One possible explanation for the difference is lack of financial literacy. However, there is a broader human tendency for people to have a positive bias in judgements of their own behaviour relative to others (Alicke and Govorun, 2005). The implication is that the norms of gamblers are distorted – they tend to believe that their level of gambling is more common that it is.

Gambling is viewed negatively by the public. A majority believe that it should be discouraged, and large majorities believe that there are now too many opportunities to gamble, and that gambling is dangerous for family life. Opinion is more divided regarding whether people should be allowed to gamble whenever they wish, with only a minority wanting to see a ban. However, less than 10% believe that, on balance, gambling is good for society. The conflict between these views and the evidence that a majority of people report having gambled over the previous four weeks presents a policy challenge. Opinions stated on this point may be subject to social desirability bias, or may reflect greater nuance in judgements of different types of gambling than is detectable in standard survey measures. For instance, people may hold different views about playing the lottery versus betting on sport or gambling in online casinos.

Among those who had gambled during the previous four weeks, 89% said that they were happy with the amount that they gamble. However, two-thirds of people with PG and more than one-quarter of those with moderate evidence of PG said that

they wish they gambled less than they currently do. This is consistent with the idea that the gambling landscape is inducing self-control failures among many people with PG, such that their short-term daily behaviours are inconsistent with their longer-term aims.

When asked about causes of PG, the two most common responses identified the availability of opportunities to gamble and exposure to gambling advertising. Stressful individual circumstances and social circles also featured strongly as reasons.

Finally, we found significant associations between PG and mental health. People with PG experience substantially worse mental health than others. The impact extends beyond the individual to family members. Future research is required to identify the causal pathway in this relationship.

4.2 POLICY IMPLICATIONS

The evidence provided in this report has serious implications for understanding the role that gambling plays in Irish life. A majority of adults in Ireland gamble regularly (we record 74% who gambled in a four-week period) and most are not people with PG. The industry generates economic value; businesses that offer gambling services support jobs and livelihoods. The industry provides entertainment for many and the supply of that entertainment represents an economic good. However, it has been understood for a long time that gambling causes harm to some individuals and families. Up to now, a tenable view has been that these harms were confined to a tiny minority who could be directed towards advice and support services. This perspective is difficult to maintain based on the statistical evidence provided here.

PG appears to be a much larger problem than previously thought; our estimates are fully an order of magnitude higher than previous ones. Moreover, our estimates imply that approaching half of the revenues collected by the industry may be derived from customers who are either people with PG or who display moderate evidence of PG. These data therefore fundamentally alter our understanding of the balance between the economic value that the industry generates and the harms associated with gambling. Indeed, Ireland may benefit from a review of the economic cost of gambling-related harms, as has been carried out in the UK (Office for Health Improvement and Disparities and Public Health England, 2023).

A substantive proportion of spending on lotteries and scratch cards also derives from people with PG or showing moderate evidence of PG. While many people enjoy playing the National Lottery and its associated instant games, and these

forms of gambling generate funding for good causes, we find that the small proportion of the population with PG accounts for 17% of spending on lotteries and scratch cards and that these activities make up 20% of the gambling spend of those with PG. Moreover, scratch cards in particular produce highly visible and frequent opportunities to gamble, with short time intervals between wagers and potential payouts. These properties are unlikely to be helpful for large numbers of people with PG, yet are being provided as part of a national funding mechanism for good causes. The National Lottery is the largest provider of these products, but lotteries or scratch cards are also provided by charities and sports clubs, as well as featuring in many other local fund raising efforts.

An assessment of the current level of provision of support and treatment services for people with PG and those with gambling addictive disorder was not addressed by the current research and is, in any case, beyond the expertise of the research team. However, it is clearly the case that, even if one were to deem the previous level of provision to be adequate, the very much greater extent of PG that we have identified implies an equivalently greater need for support and treatment services (Columb et al., 2021; Condron et al., 2022; O'Gara, 2018).

At the time of writing, the Gambling Regulation Bill (Houses of the Oireachtas, 2022) is making its way through the Oireachtas. This Bill proposes multiple restrictions on gambling marketing and advertising. These include: a ban on advertising via electronic communications without explicit consent (i.e., where the individual has not opted-in to seeing such advertisements); restrictions on the daily times when gambling advertisements are permitted; restrictions on sponsorship activity by gambling companies; and a ban on inducements to gambling activities (e.g., offering free bets). In addition to estimating the likely true extent of PG, our findings show that the general public views the modern availability of opportunities to gamble and the extent of advertising of these opportunities as the primary causes of PG. The findings therefore suggest an alignment between some of the restrictive measures proposed in the Bill and the public's views about what lies behind PG. Within our findings, people with PG themselves reveal difficulties associated with self-control, providing evidence in support of pre-set limits on expenditure and restrictions on gambling paid for via credit.

As well as showing that PG is much more prevalent than previously estimated, this report demonstrates that it occurs more widely across society. Although it is the case that men, younger adults and people in lower socioeconomic groups are more likely to be people with PG, the effect is perhaps not as large as previously believed based on studies that have recorded far fewer people with PG. Consequently, the argument for targeting preventative policy or service provision towards these specific groups is not strong. For instance, we find that more than half of people with PG have a post-secondary qualification, while almost one-quarter have at

least a primary degree. Among those who are people with PG or indicate moderate evidence of PG, more than one-third are women.

4.3 LIMITATIONS AND FUTURE RESEARCH

Chapter 2 described the pros and cons of online surveys and panel participants. On balance, we judged that such an approach was most appropriate for the current policy context in Ireland, while taking multiple precautions to address issues highlighted in other studies. We recruited participants from multiple panels with different incentive structures; employed attention checks in the survey, pre-registered the study; and weighted the data on sociodemographic characteristics (and checked the impact of weighting on behavioural ones). There remain, however, other limitations with online panel surveys of which readers should be mindful. First, the study relied on informed consent from participants; we cannot know the prevalence of PG among those who decline to take part (as with traditional probability sampling studies). If people with PG are less likely to engage with surveys for little-to-no compensation compared to the rest of the population, our estimate is downward biased. If they are more likely, it is upward biased.

Second, the study required participants to have not only the willingness to engage in an online survey but also the capacity. This has further implications for our estimate. The 7% of the population who have no internet access are not represented in the survey (CSO, 2021). As this group can only engage in offline forms of gambling, they may be less likely to exhibit PG behaviours (although we cannot be sure). Moreover, our sample contains few respondents over 80 years of age. Given the association between younger age and PG, this too may bias our estimate upwards. Despite efforts to ensure the survey was written in plain English, those with cognitive impairments are not represented; neither are minority groups with insufficient levels of English. There is some international evidence to suggest that minorities exhibit higher levels of PG (e.g., Alegría et al. 2009); hence our estimate may be downward biased by this exclusion, but again we cannot be certain if this is the case in Ireland without further research. In sum, our estimate of PG generalises to members of the population aged 18–80 years who have access to the internet and a degree of English that allows them to take part in plain-language research. Our view from the 2022 Census estimates is that this represents the vast majority of the public. In other words, the associated biases, while present, would be relatively small.

There are further limitations with prevalence surveys. Although the PGSI is considered the gold standard for measuring population prevalence of PG and using it allows for international comparison, there can be considerable variation between individuals classified as having PG. For example, an individual who spends little on gambling but nonetheless very often feels anxiety about their gambling,

who experiences gambling-caused health problems and feels they may have a problem with gambling, could achieve the same score as an individual who very often bets more than they can afford to lose, tries to win back losses and whose gambling has caused financial difficulty for their family, even if they do not recognise they have a problem or experience any anxiety. Hence, further research on the structure of PG among those who score highly is necessary to inform targeted policy interventions.

Moreover, while prevalence surveys are informative for policy, selection effects with opt-in surveys are impossible to overcome and may be particularly important for sensitive issues such as PG. It is therefore important to supplement prevalence surveys with analyses of other data sources. Assessments of medical data can provide important information on the sociodemographic characteristics of those seeking treatment and their outcomes. Relevant research exists for Ireland (Columb et al., 2021; Condron et al., 2022; Kelleher and Lynch, 2023). More effort is needed, however, to assess gambling-related harms from other perspectives. For example, Muggleton et al. (2021) analyse financial transaction data from a UK retail bank to test for associations between objectively measured gambling activity and other outcomes, such as financial difficulty (with the caveat that bank data are better suited to analysing online than offline gambling activity). Independent analyses of data held by industry and the financial sector are likely to provide important insights for policy.

4.4 CONCLUSION

The prevalence of PG is difficult to measure with precision, but estimates are nonetheless useful for policy. Our study is the first in Ireland to apply the gold standard measure of PG using a fully-anonymised administration mode. Our lowest estimate (from an unpaid online panel) puts the prevalence of PG at least four times higher than previously thought, with other sources – from other panels and perceptions of the public – placing it ten times higher. We further estimate that individuals who report multiple problematic behaviours or negative gambling outcomes account for almost half of gambling-related revenue, and most of these individuals wish to gamble less. The public holds negative views of people with problem gambling (as they perceive them) but believe that problem gambling is more likely to be caused by the widespread availability of gambling and prevalence of gambling advertisements. The findings of this report represent initial and primarily descriptive analyses of recently collected data, but they lend support to many of the measures proposed in the Gambling Regulations Bill (Houses of the Oireachtas, 2022). These data can be further exploited to inform policy, but additional research that combines multiple data sources is needed.

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APPENDIX A

Additional tables

TABLE A1 COMPARISON OF SURVEY SAMPLE TO BENCHMARK PROBABILITY SAMPLE SURVEYS IN TERMS OF PREVALENCE OF THREE NON-GAMBLING BEHAVIOURS

	Smoker	Shopped online in previous 3 months	Listened to the radio the previous day
Benchmark estimate (%)	18.4	75.0	81.1
Benchmark estimate source	Healthy Ireland Survey 2022 (Department of Health, 2023)	Information and Communications Technology Household Survey 2022 (CSO, 2022)	JNLR radio listenership survey (Ipsos MRBI, 2023)
Full sample			
Estimate weighted on sociodemographics only (%)	24.2	82.3	75.0
Estimate weighted on sociodemographics and behavioural variables (%)	18.5	75.4	81.0
Panel A			
Estimate weighted on sociodemographics only (%)	23.9	82.0	74.1
Estimate weighted on sociodemographics and behavioural variables (%)	18.1	76.4	79.9
Panel B			
Estimate weighted on sociodemographics only (%)	25.0	82.1	69.4
Estimate weighted on sociodemographics and behavioural variables (%)	19.7	74.8	76.1
Panel C			
Estimate weighted on sociodemographics only (%)	23.8	82.9	82.0
Estimate weighted on sociodemographics and behavioural variables (%)	17.7	75.0	87.3

TABLE A2 PROPORTION IN EACH PGSI CATEGORY (%). WEIGHTS RESTRICTED TO THE INTERVAL [0.33,3]

	Problem gambling	Moderate evidence	Some evidence	No evidence
Prevalence	3.2	7.3	15.3	74.2
Lower CI	2.4	6.1	13.6	72.2
Upper CI	4.0	8.6	17.0	76.2

Notes: Weighted estimates N= 2,850. CI=Confidence interval.

TABLE A3 PROPORTION IN EACH PGSI CATEGORY (%). WEIGHTS RESTRICTED TO THE INTERVAL [0.25,4]

	Problem gambling	Moderate evidence	Some evidence	No evidence
Prevalence	3.2	7.3	15.5	74.0
Lower CI	2.4	6.0	13.8	71.9
Upper CI	4.0	8.5	17.3	76.1

Notes: Weighted estimates. N= 2,850. CI=Confidence interval.

TABLE A4 PROPORTION IN EACH PGSI CATEGORY (%). WEIGHTING BASED ON BOTH BEHAVIOURAL AND SOCIODEMOGRAPHIC VARIABLES

	Problem gambling	Moderate evidence	Some evidence	No evidence
Prevalence	3.4	7.2	14.6	74.8
Lower CI	2.5	6.1	13.0	72.8
Upper CI	4.2	8.4	16.2	76.7

Notes: Weighted estimates. Weights restricted to the interval [0.5, 2], which is the interval to which the weights are restricted in our primary analysis in the main text. N= 2,850. CI=Confidence interval.

TABLE A5 PROPORTION IN EACH PGSI CATEGORY (%). UNWEIGHTED

	Problem gambling	Moderate evidence	Some evidence	No evidence
Prevalence	3.1	6.6	14.4	76.0
Lower CI	2.4	5.7	13.1	74.4
Upper CI	3.7	7.5	15.7	77.5

Notes: Unweighted estimates. Weights restricted to the interval [0.5, 2]. N= 2,850. CI=Confidence interval.

TABLE A6 LOGIT REGRESSION OF INFLUENCE OF PANEL ON PG PREVALENCE

	(1) Problem gambling	(2) Moderate evidence	(3) Some evidence	(4) No evidence
Panel B	1.082 [0.675,1.735]	0.876 [0.628,1.222]	0.805* [0.630,1.029]	1.206* [0.984,1.480]
Panel C	0.319*** [0.159,0.637]	0.370*** [0.243,0.564]	0.450*** [0.340,0.594]	2.837*** [2.234,3.604]
N	2,850	2,850	2,850	2,850

Notes: Panel A is the reference category. Exponentiated coefficients (odds ratios); 95% confidence intervals in brackets. Controls: sociodemographic weighting variables. *p<0.10, **p<0.05, ***p<0.01.

TABLE A7 COMPARING PANEL GENDER COMPOSITION TO CENSUS 2022

	Male	Female
Target (Census 2022)	49.0	51.0
Full sample	49.2	50.8
Panel A	48.3	51.7
Panel B	48.7	51.3
Panel C	50.5	49.5

Notes: Unweighted estimates. Full sample N=2,850. Panel A – N=940; Panel B – N=944; Panel C –N=966.

TABLE A8 COMPARING PANEL AGE COMPOSITION TO CENSUS 2022

	<30 yrs	30–39 yrs	40–49 yrs	50–59 yrs	60–69 yrs	70+ yrs
Target (Census 2022)	18.7	18.2	20.0	16.5	13.0	13.7
Full sample	11.9	20.7	18.4	20.9	19.0	9.1
Panel A	12.4	21.3	20.9	16.4	18.2	10.9
Panel B	12.8	22.1	19.1	20.8	18.1	7.1
Panel C	10.4	18.8	15.3	25.6	20.6	9.3

Notes: Unweighted estimates. Full sample N=2,850. Panel A – N=940; Panel B – N=944; Panel C –N=966.

TABLE A9 COMPARING PANEL EDUCATION COMPOSITION TO CENSUS 2022

	<Leaving Certificate	Leaving Certificate	Tertiary not degree	Degree+
Target (Census 2022)	24.5	19.4	28.6	27.5
Full sample	7.1	19.3	28.2	45.5
Panel A	7.3	24.6	29.9	38.2
Panel B	8.3	19.6	27.0	45.1
Panel C	5.7	13.8	27.6	52.9

Notes: Unweighted estimates. Full sample N=2,850. Panel A – N=940; Panel B – N=944; Panel C –N=966.

TABLE A10 BREAKDOWN OF SURVEY ATTRITION - NUMBER

	Number of people		
	Panel A	**Panel B**	**Panel C**
Total who started survey	1,480	1,183	2,760
Rejected from survey as over quota	304	83	1,010
Total who started and eligible	1,176	1,100	1,750
Dropped out	153	60	716
Total remaining	1,023	1,040	1,034
Failed attention check twice	23	40	35
Total who completed the survey	1,000	1,000	999
Dropped from data as failed attention check once	60	56	33
Total usable sample	940	944	966

Notes: We employed a forced-response attention check. One item was added to the PGSI requesting participants to select 'Almost always' for that question. Participants who failed the attention check were given a second chance to complete the PGSI. Those who failed a second time (98 participants) were automatically removed from the survey and could not complete it. Those who passed the second time were allowed to complete the survey and could earn the payment of €3 for completing the survey (if in panels A or B). Of the 2,999 participants who completed the survey, 149 participants failed the attention check once, and so for quality control purposes we omitted them from our analysis, giving us a final sample for analysis of 2,850.

TABLE A11 NUMBER OF DROPOUTS OCCURRING AT EACH SECTION OF THE SURVEY, BY PANEL

Section	Number of dropouts		
	Panel A	Panel B	Panel C
Information sheet	32	10	160
Consent	20	5	107
Quota questions	6	2	48
Introduction (after quota)	8	3	13
Crosswise treatment question	16	6	109
List experiment question	8	2	27
Gambling activity	18	6	101
PGSI	9	6	60
Friends questions	5	2	14
Family questions	6	3	32
Childhood experiences	5	2	N/A
Introduction to perceptions	5	0	N/A
Perception task	3	1	N/A
Perceptions and attitudes	4	4	N/A
Benchmark and mental health	6	2	20
Sociodemographics	1	4	12
Charity donation question	N/A	N/A	2
Final comments	1	2	11
Total	153	60	716

TABLE A12 PROPORTION WITH PROBLEM GAMBLING (%) AMONG THOSE WHO GAMBLED IN THE PREVIOUS 4 WEEKS, BY PANEL

	All panels	Panel A	Panel B	Panel C
Proportion who gambled in previous four weeks	74.1	79.2	74.3	68.0
PG prevalence	4.3	4.7	5.9	1.7

Notes: Weighted estimates. Full sample N=2,850. Panel A, N=940; Panel B, N=944; Panel C, N=966. CI=Confidence interval.

TABLE A13 ESTIMATED PREVALENCE OF PROBLEM GAMBLING AMONG FRIENDS AND FAMILY – DETAILED CALCULATIONS

	Friends	Family	Friends and family
A. Mean network size	4.003	5.702	9.705
B. Mean number of people with PG in network	0.104	0.117	0.221
C. PG Prevalence estimate (B/A)	2.6	2.1	2.3
D. Mean network size for those with PG	3.287	4.863	8.150
E. Mean network size for those without PG	4.027	5.731	9.757
F. Adjustment factor (D/E)	1.223	1.178	1.197
G. Adjusted prevalence (C*F)	3.2	2.4	2.7

Notes: Weighted estimates. N=2,850. CI=Confidence interval.

TABLE A14 ESTIMATED PREVALENCE OF PROBLEM GAMBLING OF FRIENDS

	Panel A	Panel B	Panel C
Prevalence estimate	2.5	2.2	3.0
Lower CI	2.0	1.7	2.5
Upper CI	3.0	2.7	3.6

Notes: Weighted estimates. Panel A – N=940; Panel B – N=944; Panel C –N=966. CI=Confidence interval.

TABLE A15 ESTIMATED PREVALENCE OF PROBLEM GAMBLING OF FAMILY

	Panel A	Panel B	Panel C
Prevalence estimate	1.7	2.3	2.1
Lower CI	1.4	1.9	1.7
Upper CI	2.1	2.7	2.5

Notes: Weighted estimates. Full sample N=2,850. Panel A – N=940; Panel B – N=944; Panel C –N=966. CI=Confidence interval.

TABLE A16 ESTIMATED PREVALENCE OF PROBLEM GAMBLING – OF FRIENDS AND FAMILY

	Panel A	Panel B	Panel C
Prevalence estimate	2.0	2.3	2.5
Lower CI	1.8	2.0	2.2
Upper CI	2.3	2.6	2.8

Notes: Weighted estimates. Full sample N=2,850. Panel A – N=940; Panel B – N=944; Panel C N=966. CI=Confidence interval.

TABLE A17 QUESTION ORDER EXPERIMENT – SOCIODEMOGRAPHIC BALANCE CHECK

	Control	Treatment	P-value
Female	49.5%	53.1%	0.100
Age	47.2	46.9	0.711
< Leaving Certificate	16.5%	13.4%	0.116
Leaving Certificate	21.2%	22.2%	0.610
Tertiary not degree	30.5%	33.8%	0.109
Degree or higher	31.8%	30.7%	0.515

Notes: Weighted estimates. P-value obtained from t-test of equality of means between the control and treatment groups.

TABLE A18 CROSSWISE AND LIST EXPERIMENT – SOCIODEMOGRAPHIC BALANCE CHECK

	Control	Treatment	P-value
Female	49.9%	52.0%	0.362
Age	48.1	46.6	0.070
< Leaving Certificate	16.0%	14.4%	0.424
Leaving Certificate	21.5%	21.7%	0.919
Tertiary not degree	31.4%	32.6%	0.579
Degree or higher	31.1%	31.4%	0.882

Notes: Weighted estimates. P-value obtained from t-test of equality of means between the control and treatment groups.

TABLE A19 CROSSWISE MODEL – SIMULATIONS FOR DIFFERENT LEVELS OF UNDETECTED RANDOM RESPONSES

Undetected random responders (number)	Undetected random responders (%)	Prevalence estimate	Lower CI	Upper CI
0	0.0	11.7	8.8	14.7
50	2.9	11.2	8.2	14.2
100	5.7	10.7	7.7	13.6
150	8.6	10.1	7.1	13.1
200	11.5	9.4	6.4	12.5
250	14.3	8.8	5.7	11.9
300	17.2	8.1	5.0	11.2
350	20.0	7.3	4.2	10.4

Notes: Weighted estimates. Assumes that the proportion of undetected random responders who answer 'the same' to the crosswise question is the same as the proportion among the detected random responders.

TABLE A20 GAMBLING EXPENDITURE – INCLUDING GAMBLING WITH FRIENDS AND FAMILY

	Full sample	Problem gambling	Moderate evidence	Some evidence	No evidence
Prevalence	100.0	3.3	7.1	15.0	74.7
Mean spend – All	28	260	71	43	11
Median spend – All	7	111	40	22	4
% of overall spend – All	100.0	30.2	17.9	22.6	29.3
Mean spend – In person	14	128	24	19	6
Median spend – In person	4	21	15	8	2
% of aggregate spend – In person	100.0	30.9	12.7	21.3	35.2
Mean spend – Online	15	132	47	23	5
Median spend – Online	0	65	17	6	0
% of aggregate spend – Online	100.0	29.6	22.8	23.8	23.8

Note: Weighted estimates. N=2,850.

TABLE A21 GAMBLING EXPENDITURE INCLUDING GAMBLING WITH FRIENDS AND FAMILY – PANEL A

	Full sample	Problem gambling	Moderate evidence	Some evidence	No evidence
Prevalence	100.0	4.1	8.9	18.9	68.0
Mean spend – All	33	228	78	51	11
% of overall spend – All	100.0	28.3	20.9	29.2	21.6
Mean spend – In person	16	147	25	17	7
% of aggregate spend – In person	100.0	37.2	13.7	19.5	29.7
Mean spend – Online	17	81	53	34	3
% of aggregate spend – Online	100.0	19.7	27.8	38.6	13.9

Note: Weighted estimates. N=940.

TABLE A22 GAMBLING EXPENDITURE INCLUDING GAMBLING WITH FRIENDS AND FAMILY – PANEL B

	Full sample	Problem gambling	Moderate evidence	Some evidence	No evidence
Prevalence	100.0	4.4	8.7	16.7	70.2
Mean spend – All	31	210	71	38	13
% of overall spend – All	100.0	29.8	20.2	20.6	29.5
Mean spend – In person	14	76	24	26	6
% of aggregate spend – In person	100.0	23.6	15.0	30.8	30.6
Mean spend – Online	17	135	47	12	7
% of aggregate spend – Online	100.0	34.9	24.6	12.0	28.5

Note: Weighted estimates. N=944.

TABLE A23 GAMBLING EXPENDITURE INCLUDING GAMBLING WITH FRIENDS AND FAMILY – PANEL C

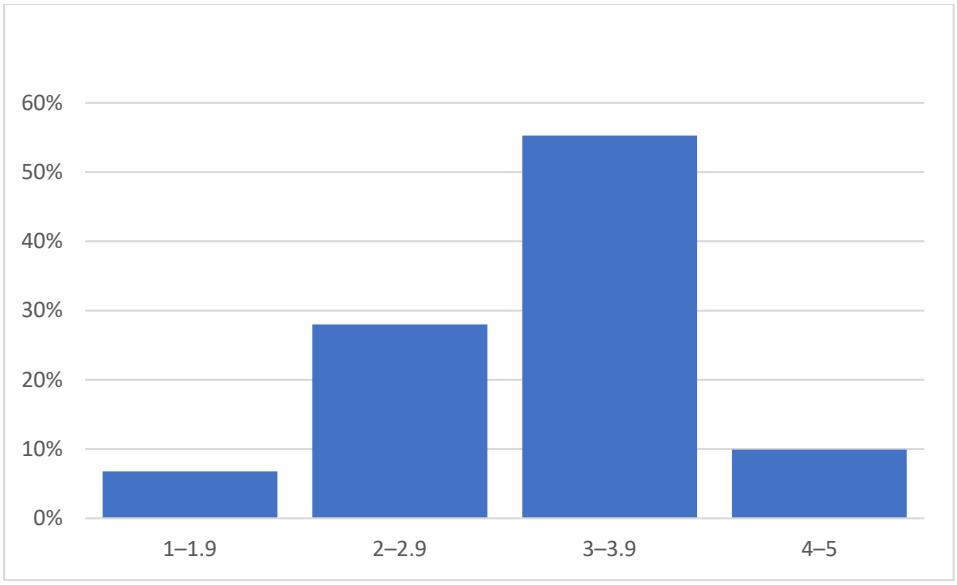
	Full sample	Problem gambling	Moderate evidence	Some evidence	No evidence
Prevalence	100.0	1.2	3.3	8.6	86.9
Mean spend – All	20	585	52	31	10
% of overall spend – All	100.0	34.5	8.5	13.6	43.4
Mean spend – In person	10	261	23	12	6
% of aggregate spend – In person	100.0	30.1	7.5	10.5	52.0
Mean spend – Online	10	325	29	19	4
% of aggregate spend – Online	100.0	39.2	9.7	16.8	34.3

Note: Weighted estimates. N=966.

APPENDIX B

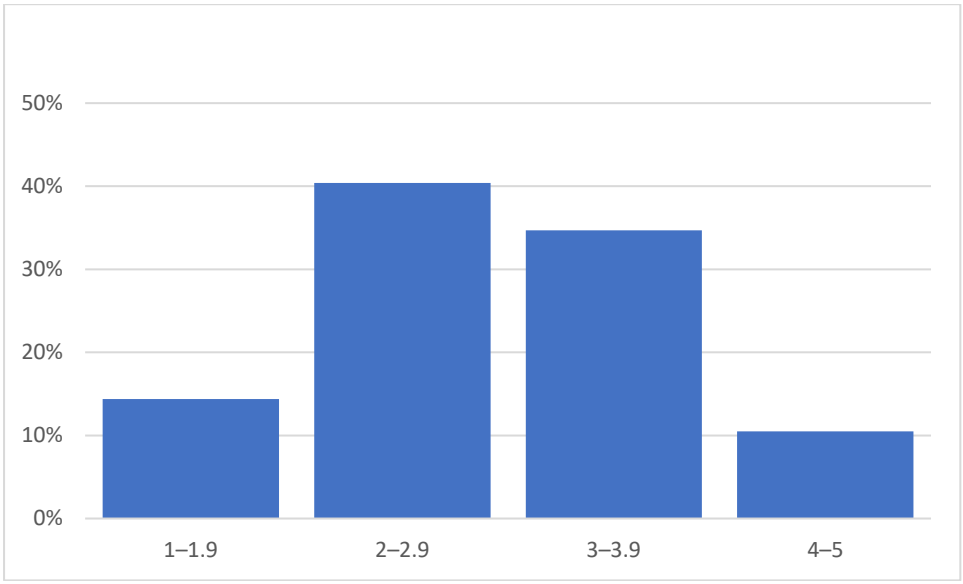
Additional figures

FIGURE A1 STIGMA SCALE SCORE – SUBSAMPLE WITH PG



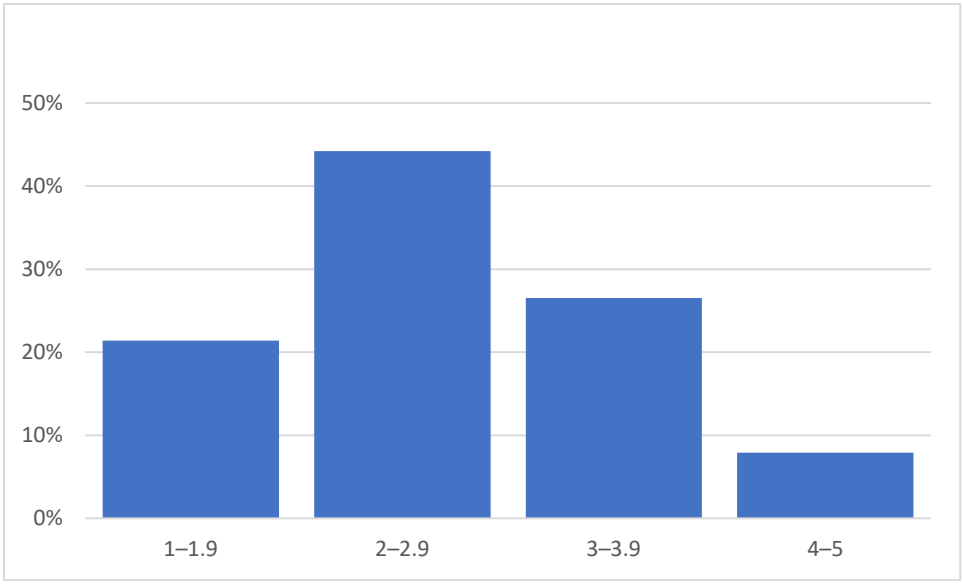
Notes: Weighted estimates. N=76. The higher the score on the five-point stigma scale, the higher the level of stigma.

FIGURE A2 STIGMA SCALE SCORE – SUBSAMPLE WHO GAMBLED IN PREVIOUS 4 WEEKS BUT DON'T HAVE PG



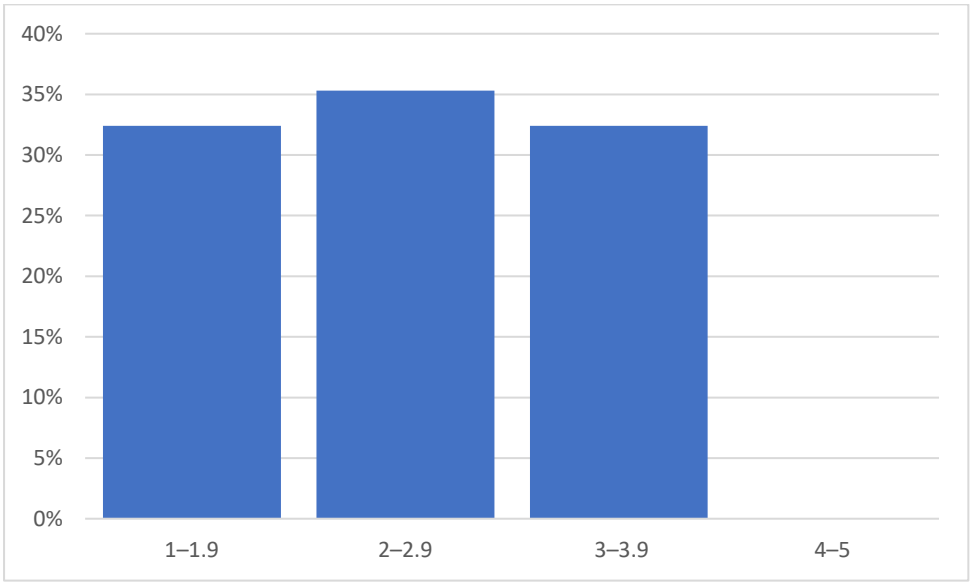
Notes: Weighted estimates. N=1,369. The higher the score on the five-point stigma scale, the higher the level of stigma.

FIGURE A3 STIGMA SCALE SCORE – SUBSAMPLE WHO DIDN'T GAMBLE IN THE PREVIOUS 4 WEEKS



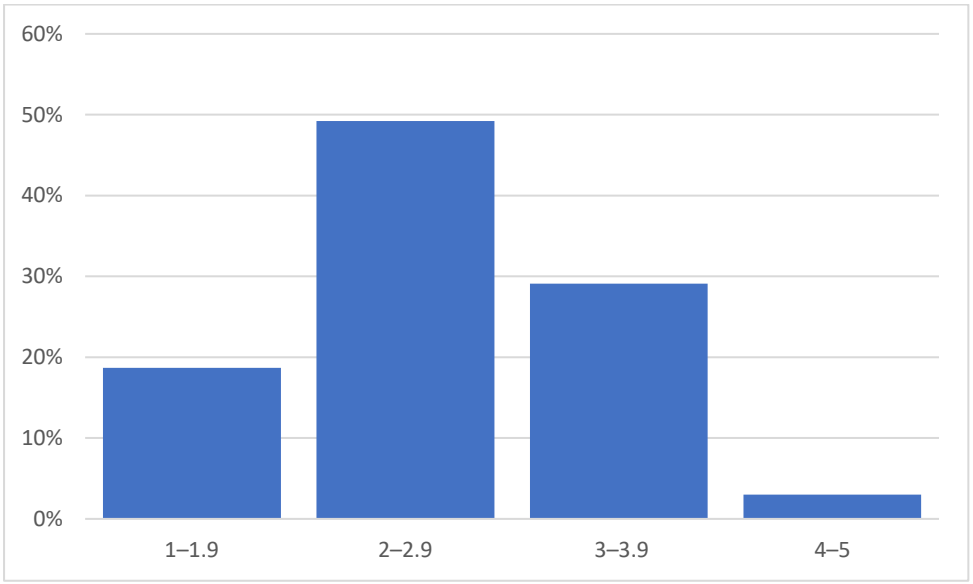
Notes: Weighted estimates. N=439. The higher the score on the five-point stigma scale, the higher the level of stigma.

FIGURE A4 ATTITUDES TOWARDS GAMBLING SCALE – DISTRIBUTION OF OVERALL SCORES FOR SUBSAMPLE WITH PG



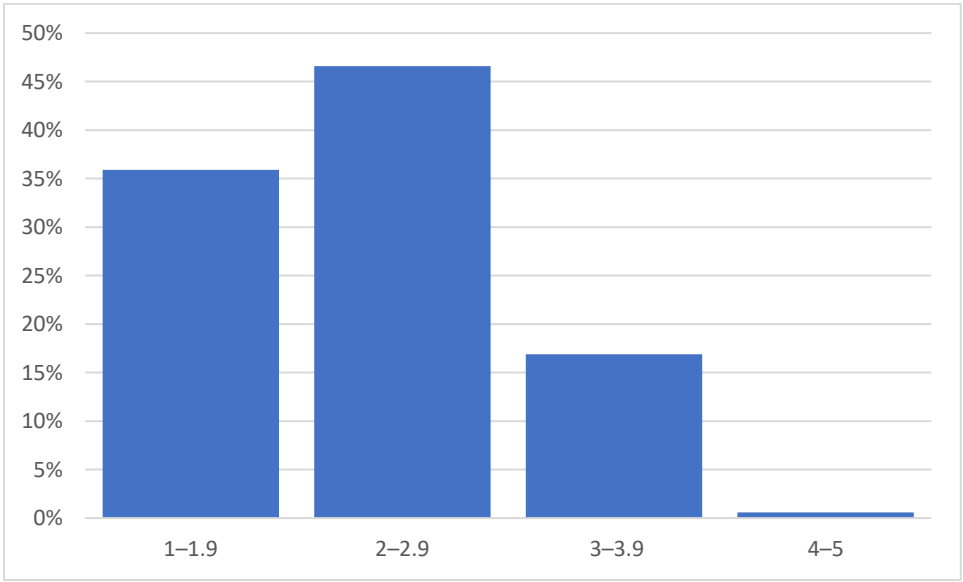
Notes: Weighted estimates. N=76. A higher score on the five-point scale means a more positive attitude towards gambling.

FIGURE A5 ATTITUDES TOWARDS GAMBLING SCALE – DISTRIBUTION OF OVERALL SCORES FOR SUBSAMPLE WITHOUT PG WHO GAMBLED IN THE PREVIOUS FOUR WEEKS



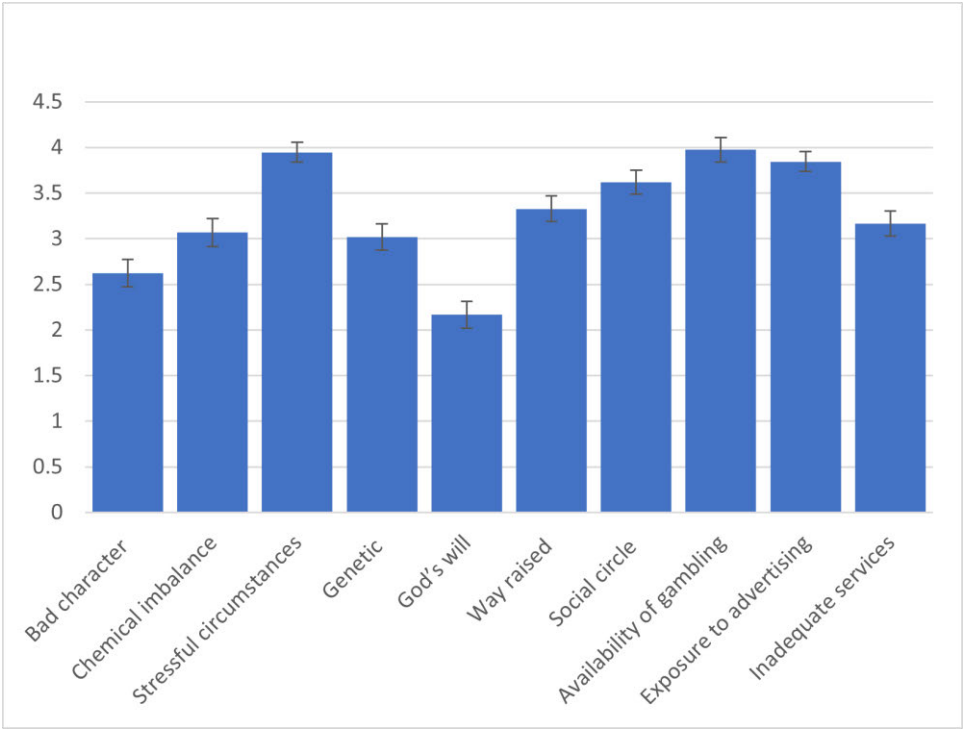
Notes: Weighted estimates. N=1,369. A higher score on the five-point scale means a more positive attitude towards gambling.

FIGURE A6 ATTITUDES TOWARDS GAMBLING SCALE – DISTRIBUTION OF OVERALL SCORES FOR SUBSAMPLE WHO DIDN'T GAMBLE IN THE PREVIOUS FOUR WEEKS



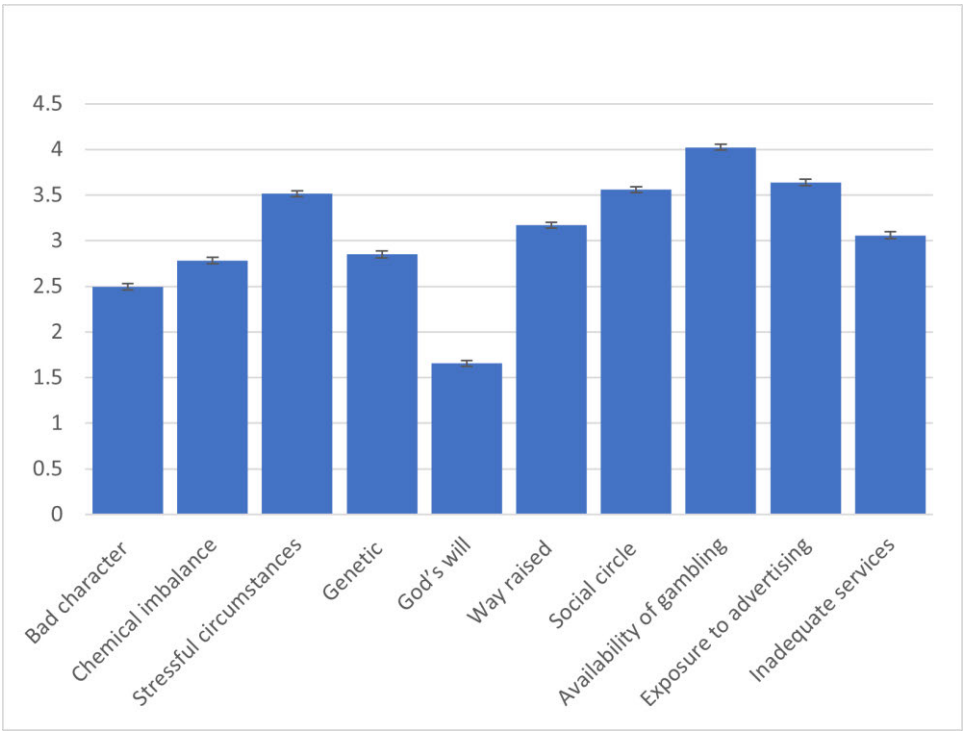
Notes: Weighted estimates. N=439. A higher score on the five-point scale means a more positive attitude towards gambling.

FIGURE A7 PERCEIVED LIKELIHOOD OF VARIOUS FACTORS CAUSING PG – MEAN SCORES FOR THE SUBSAMPLE WITH PG



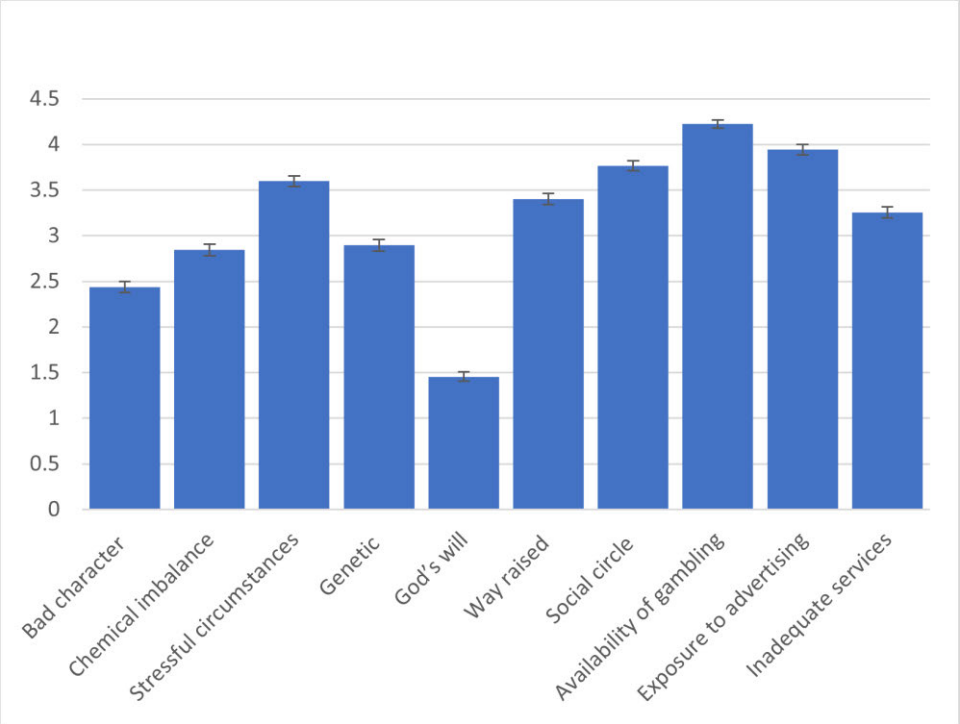
Notes: Weighted estimates. N= 76. A higher score on the five-point scale means a higher perceived likelihood that a given factor causes PG. 95% confidence intervals shown.

FIGURE A8 PERCEIVED LIKELIHOOD OF VARIOUS FACTORS CAUSING PG – MEAN SCORES FOR THE SUBSAMPLE WITHOUT PG WHO GAMBLED IN THE PREVIOUS FOUR WEEKS



Notes: Weighted estimates. N= 1,396. A higher score on the five-point scale means a higher perceived likelihood that a given factor causes PG. 95% confidence intervals shown.

FIGURE A9 PERCEIVED LIKELIHOOD OF VARIOUS FACTORS CAUSING PG – MEAN SCORES FOR THE SUBSAMPLE WHO DIDN'T GAMBLE IN THE PREVIOUS 4 WEEKS



Notes: Weighted estimates. N= 439. A higher score on the five-point scale means a higher perceived likelihood that a given factor causes PG. 95% confidence intervals shown.

APPENDIX C

Study materials

INFORMATION SHEET AND CONSENT FORM

PARTICIPANT INFORMATION SHEET

Thank you for your interest in this research. First we will explain what the study is about and what to expect during your participation. Please read this information carefully.

Who is conducting this research?
We are the Behavioural Research Unit at the Economic and Social Research Institute (ESRI). We are funded by public bodies interested in helping to understand how people make decisions.

What is the research about?
This survey is about gambling behaviours, perceptions and attitudes. You don't need to know anything about gambling before taking part – everything you need to know will be explained to you before you answer any questions.

The survey will take around 15 minutes. Please complete the survey in one sitting.

You can do the survey on your phone, computer or tablet. If using a computer or tablet please set the browser window to full screen (you can usually do this by pressing F11).

If you have difficulty loading any page, please refresh your browser – your progress will be saved as you complete the study.

How will my responses be recorded?
All of your answers will remain confidential. They will not be stored with your name. Instead, we store them against a number (your 'private ID'). We have a file that matches this private ID to your [online panel] account, so that we can pay you. As soon as everyone has taken part and been paid, we delete the file that links your private ID to your [online panel] account. So all responses are kept anonymous.

The responses will initially be held on the survey company's Microsoft servers in Dublin, then transferred to secure files on the ESRI server. Once all responses have been made anonymous they will be put up online for other researchers to study, in line with best scientific practice.

Data protection
This study is carried out in accordance with data protection legislation. You can find detailed information about privacy and data protection for research conducted by the ESRI by following this link: https://www.esri.ie/esri-privacy-notice-for-research.

If you have any further queries in relation to this, please contact DataProtection@esri.ie.

Are there any risks involved?
Some of the questions are about gambling and other topics, including mental health and childhood experiences, that may be uncomfortable for some people. Some people may find it uncomfortable to answer questions on gambling. You can choose to stop at any time if you feel too uncomfortable

answering the questions. Your data will not be saved if you do not complete the survey. If you wish to stop, you can just exit your browser.

- I have read and understand the information on the previous pages, which explains the nature of the study I am to undertake.
- I consent to taking part as a study participant.
- I confirm that I am aged 18 or over.
- I understand that the aim of the research is to analyse gambling behaviours, perceptions and attitudes in Ireland.

I agree with all of the above points ☐

- I understand that I will be presented with a series of questions through my browser and that my responses will initially be recorded and stored on the survey company's Microsoft servers in Dublin. I understand that, once all data has been collected, my responses will subsequently be deleted from those servers and stored on ESRI computers only.
- I understand that the study data will be stored against a private ID which is unique to this study and cannot be used to identify me.
- I understand that the data will be available to researchers and will only be used for research purposes. I understand that my anonymous responses may be made available in online data repositories for research purposes.

I agree with all of the above points. ☐

- I understand that I may withdraw participation at any point during the study by exiting the web browser, and that no data will be stored unless I complete the study in full.
- I understand that once the study ends I will not be able to withdraw my data (as these data will be completely anonymised and so cannot be linked to me).

I agree with all of the above points. ☐

I have read and understood the above and consent to taking part as a survey participant. ☐

QUOTA SCREENING QUESTIONS

What is your gender? Female, Male, Non-binary, Prefer not to say.

Which age group do you belong to? Under 40, 40-59, 60+.

What region do you live in? Leinster, Munster, Connacht/Ulster.

Please indicate to which occupational group the chief income earner in your household belongs, or which group fits best. If the chief income earner is retired, or is not in paid employment but has been out of work for less than six months, please answer for their most recent occupation.

Options: Higher managerial / professional / administrative (e.g., doctor, board director); Intermediate manager / professional / administrative (e.g., newly qualified solicitor, middle manager); Supervisory or clerical / junior managerial / professional / administrative (e.g., office worker, salesperson); Skilled manual worker (e.g., bricklayer, bus or ambulance driver, pub/bar worker); Semi-skilled or unskilled manual work (e.g., manual worker, apprentice, shop assistant); Casual worker – not in permanent employment OR unemployed for the last six months or more; Full-time carer; Farmer / agricultural worker; Student; Unsure.

INTRODUCTION

Thank you for agreeing to take part in this study. As mentioned before, this survey is mainly about gambling, but we also ask about some other topics as well.

Gambling refers to any instance in which someone bets something of value (e.g., money) on the outcome of an event. We are interested in all forms of gambling, such as sports betting, online and in-person casino games, lotteries, scratch cards, bingo, card games with monetary stakes and so on. You will be asked questions about your own gambling behaviour as well as that of people you know, and also about your thoughts on gambling more generally.

In the questions we ask, there are no right or wrong answers. Your responses are important and may be used to inform policy **– please try to answer as honestly as possible**.

Participants are randomised to one of two groups. Those in the treatment group receive the questions in blue font below. Those in the control group receive the questions in green font.

SECTION A. CROSSWISE MODEL

TREATMENT GROUP

Before beginning the main part of the survey, we first have a few questions that are slightly different to normal survey questions.

Practice question

In the dotted box below are two questions, which can be answered with 'yes' or 'no'. We do not need to know what your answer to each question is, but only if your answers to the two questions are ***the same*** or ***different***. In other words, please indicate whether:

(a) your answers are both 'yes' or both 'no' (the same) or

(b) one of your answers is 'yes' and the other is 'no' (different).

1. In the last 12 months, have you won money in a lottery?
2. Do you have a pet?

a) BOTH of my answers are 'yes' or BOTH of my answers are 'no' (i.e., my answers to both questions are THE SAME).

b) One of my answers is 'yes' and the other is 'no' (i.e., my answers to the questions are DIFFERENT).

If (a) is chosen, the following text appears:

You have responded that both of your answers are **the same**. This means that one of the following statements should be true for you:

(i) My answer to question 1 is 'yes' and my answer to question 2 is 'yes'.

(ii) My answer to question 1 is 'no' and my answer to question 2 is 'no'.

Is one of these statements true for you? If so, click the 'Next' button below to proceed. If not, please change your response above.

If (b) is chosen, the following text appears.

You have responded that your answers to the questions are **different.** This means that one of the following statements should be true for you:

(i) My answer to question 1 is 'yes' and my answer to question 2 is 'no'.

(ii) My answer to question 1 is 'no' and my answer to question 2 is 'yes'.

Is one of these statements true for you? If so, click the 'Next' button below to proceed. If not, please change your response above.

Main question

In the dotted box below are another two questions. As on the previous page, we only want to know if your answers to the two questions are ***the same*** or ***different***. In other words, please indicate whether:

(a) your answers are both 'yes' or both 'no' (your answers are the same) or

(b) one of your answers is 'yes' and the other is 'no'.

1. In the last 12 months, has your gambling caused any financial problems for you or your household?
2. Was your mother born in either January or February?

a) BOTH of my answers are 'yes' or BOTH of my answers are 'no' (i.e., **my answers to both questions are the same**).

b) One of my answers is 'yes' and the other is 'no' (i.e., **my answers to each question are different**).

If (a) is chosen, the following text appears:

You have responded that both of your answers are **the same**. This means that one of the following statements should be true for you:

(i) My answer to question 1 is 'yes' and my answer to question 2 is 'yes'.

(ii) My answer to question 1 is 'no' and my answer to question 2 is 'no'.

Is one of these statements true for you? If so, click the 'Next' button below to proceed. If not, please change your response above.

If (b) is chosen, the following text appears.

You have responded that your answers to the questions are **different.** This means that one of the following statements should be true for you:

(i) My answer to question 1 is 'yes' and my answer to question 2 is 'no'.

(ii) My answer to question 1 is 'no' and my answer to question 2 is 'yes'.

Is one of these statements true for you? If so, click the 'Next' button below to proceed. If not, please change your response above.

Correcting for random responses (Schnapp, 2019)

Did you respond on the previous page by just clicking one of the options at random?

Please answer honestly – your response won't affect your payment or ability to proceed with the survey.

- Yes
- No

CONTROL GROUP

IMPORTANT

Some of the following questions may feel like they don't apply to you for various reasons.

However, it is important that you answer every question as honestly as you can, even those that you feel don't apply to you.

Page 2

In the last 12 months, has your gambling caused any financial problems for you or your household?

- Yes
- No

In the last 12 months, have you felt that you might have a problem with gambling?

- Yes
- No

SECTION B. LIST EXPERIMENT

TREATMENT GROUP

Below is a list of four statements that may or may not apply to you **over the past 12 months**.

Please select **how many** apply to you – you don't need to select which ones, just how many.

In the last 12 months…

- I bought an investment product (e.g., shares, bonds or mutual funds)
- I bought a lottery ticket or a scratch card
- I felt that there has been too much gambling advertising
- I felt that I might have a problem with gambling.

Position in which the problem gambling item appears will be randomised.

Answer options:

0 1 2 3 4

CONTROL GROUP

This question is slightly different to normal survey questions.

Below is a list of three statements that may or may not apply to you **over the past 12 months**.

Please select **how many** apply to you – you don't need to select which ones, just how many.

In the last 12 months…

- I bought an investment product (e.g., shares, bonds or mutual funds)
- I bought a lottery ticket or a scratch card
- I felt that there has been too much gambling advertising.

Answer options:

0 1 2 3

SECTION C. GAMBLING BEHAVIOUR

ALL PARTICIPANTS (TREATMENT AND CONTROL) RECEIVE THE SAME SURVEY QUESTIONS FROM HERE ON.

HOWEVER, THE ORDER OF SECTIONS C AND D WILL BE RANDOMISED – HALF OF PARTICIPANTS WILL SEE C FIRST AND HALF WILL SEE D FIRST.

The next questions are about the gambling activities you spent money on in the last four weeks. Remember, your responses to the following questions are completely anonymous. Please answer as honestly as you can.

Activities spent money on – Adapted from UK Gambling Commission quarterly survey (UK Gambling Commission, 2023)

Q1. In the last **four weeks**, have you **spent money** on any of the following forms of gambling?

Please do not include any form of gambling that you did not spend money on (e.g., playing card games with friends with no wagers).

a) Betting on horse or dog races: Yes/No
b) Betting on other sports such as soccer, rugby, GAA, golf: Yes/No
c) Lottery tickets: Yes/No
d) Scratch cards or instant wins: Yes/No
e) Bingo: Yes/No
f) Fruit/slot machine style games online or in a physical location (e.g., an arcade, a casino): Yes/No
g) Roulette, poker, cards or dice online or in a casino: Yes/No
h) Spread betting (e.g., on shares or foreign currencies): Yes/No
i) Bets or gambling between friends: Yes/No
j) Any other form of gambling not described above: Yes/No
   If (j) is selected, an open text box appears: 'Please briefly describe in the box below the other form(s) of gambling you have spent money on in the last four weeks.'

Activities spent money on: Detail

Q2. Thinking about each of the activities below, **where** did you spend money on each activity in the last **four weeks**? For each activity, tick all that apply. Again, please only choose places you **spent money**.

[Of the activities listed below, participants will only be shown those activities that they said they spent money on in Q1.]

a) Fruit/slot machine style games:
   - ☐ Online
   - ☐ In a physical location (e.g., an arcade, a casino)

b) Roulette, poker, cards or dice:
   - ☐ Online
   - ☐ In a casino

c) Betting on horse or dog races:
   - ☐ Online
   - ☐ In person at a bookmaker's
   - ☐ In person at a race venue
   - ☐ Over the phone

d) Betting on other sports (apart from horse and dog racing) such as soccer, rugby, GAA, golf:
   - ☐ Online
   - ☐ In person at a bookmaker's
   - ☐ Over the phone

e) Lottery tickets:
   - ☐ Online
   - ☐ In person

f) Scratch cards or instant wins:
   - ☐ Online
   - ☐ In person

g) Bingo:
   - ☐ Online
   - ☐ In person

h) The other forms of gambling you have spent money on (Text respondent wrote in open textbox for Q1(j) shown here):
   - ☐ Online
   - ☐ In person

Gambling frequency – Adapted from UK Gambling Commission quarterly survey (UK Gambling Commission, 2023)

Q3. Thinking about each of the activities below, **how often**, on average, did you spend money on each activity in the last **four weeks**? If you're not sure give your best guess.

[Of the activities listed below, participants will be shown only those activities that they said they spent money on in Q1 and all modes that they said they used in Q2.]

a) Fruit/slot machine style games
   - Online
     - Everyday/almost every day
     - 4–5 days a week
     - 2–3 days a week
     - About once a week
     - Less than once a week

- In a physical location (e.g., an arcade, a casino)
    - Everyday/almost every day
    - 4–5 days a week
    - 2–3 days a week
    - About once a week
    - Less than once a week

b) Roulette, poker, cards or dice
- Online
    - Everyday/almost every day
    - 4–5 days a week
    - 2–3 days a week
    - About once a week
    - Less than once a week

- In a casino
    - Everyday/almost every day
    - 4–5 days a week
    - 2–3 days a week
    - About once a week
    - Less than once a week

c) Betting on horse or dog races
- Online
    - Everyday/almost every day
    - 4–5 days a week
    - 2–3 days a week
    - About once a week
    - Less than once a week

- In person at a bookmaker's or a race venue, or over the phone
    - Everyday/almost every day
    - 4–5 days a week
    - 2–3 days a week
    - About once a week
    - Less than once a week

d) Betting on sports other than horse and dog racing such as soccer, rugby, GAA, golf
- Online
    - Everyday/almost every day
    - 4–5 days a week
    - 2–3 days a week
    - About once a week
    - Less than once a week

- In person at a bookmaker's, or over the phone
    - Everyday/almost every day
    - 4–5 days a week
    - 2–3 days a week
    - About once a week
    - Less than once a week

e) Spread betting (e.g., on shares or foreign currencies)
    - Everyday/almost every day
    - 4–5 days a week
    - 2–3 days a week
    - About once a week
    - Less than once a week

f) Lottery tickets
    - Online
        - Everyday/almost every day
        - 4–5 days a week
        - 2–3 days a week
        - About once a week
        - Less than once a week

    - In person
        - Everyday/almost every day
        - 4–5 days a week
        - 2–3 days a week
        - About once a week
        - Less than once a week

g) Scratch cards or instant wins
    - Online
        - Everyday/almost every day
        - 4–5 days a week
        - 2–3 days a week
        - About once a week
        - Less than once a week

    - In person
        - Everyday/almost every day
        - 4–5 days a week
        - 2–3 days a week
        - About once a week
        - Less than once a week

h) Bingo
    - Online
        - Everyday/almost every day
        - 4–5 days a week
        - 2–3 days a week
        - About once a week
        - Less than once a week

    - In person
        - Everyday/almost every day
        - 4–5 days a week
        - 2–3 days a week
        - About once a week
        - Less than once a week

i) Bets or gambling between friends
    - Everyday/almost every day
    - 4–5 days a week
    - 2–3 days a week
    - About once a week
    - Less than once a week

j) The other forms of gambling you have spent money on:
[Text they wrote in open textbox for Q1(j) shown here]
    - Online
        - Everyday/almost every day
        - 4–5 days a week
        - 2–3 days a week
        - About once a week
        - Less than once a week

    - In person
        - Everyday/almost every day
        - 4–5 days a week
        - 2–3 days a week
        - About once a week
        - Less than once a week

Gambling spend

Q4. Thinking about the last four weeks, **how much** money, on average, did you spend on gambling each week? If you're not sure give your best guess.

Of the activities listed below, participants will be shown only those activities that they said they spent money on in Q1 and all modes that they said they used in Q2.

When a participant selects a category (e.g., €10–€20 a week), a slider will appear asking them to specify the exact amount (e.g., a slider that starts at €10 and ends at €20).

Specific wording: 'Please specify the exact amount by clicking and dragging on the slider scale below.'

a) Fruit/slot machine style games
    - Online
        - Less than €5 a week
        - €5–€9 a week
        - €10–€20 a week
        - €21–€50 a week
        - €51–€100 a week
        - €101–€200 a week
        - More than €200 a week

    - In a physical location (e.g., an arcade, a casino)
        - Less than €5 a week
        - €5–€9 a week

- €10–€20 a week
- €21–€50 a week
- €51–€100 a week
- €101–€200 a week
- More than €200 a week

b) Roulette, poker, cards or dice
   - Online
     - Less than €5 a week
     - €5–€9 a week
     - €10–€20 a week
     - €21–€50 a week
     - €51–€100 a week
     - €101–€200 a week
     - More than €200 a week

   - In a casino
     - Less than €5 a week
     - €5–€9 a week
     - €10–€20 a week
     - €21–€50 a week
     - €51–€100 a week
     - €101–€200 a week
     - More than €200 a week

c) Betting on horse or dog races
   - Online
     - Less than €5 a week
     - €5–€9 a week
     - €10–€20 a week
     - €21–€50 a week
     - €51–€100 a week
     - €101–€200 a week
     - More than €200 a week

   - In person at a bookmaker's or a race venue, or over the phone
     - Less than €5 a week
     - €5–€9 a week
     - €10–€20 a week
     - €21–€50 a week
     - €51–€100 a week
     - €101–€200 a week
     - More than €200 a week

d) Betting on sports other than horse and dog races such as soccer, rugby, GAA, golf
   - Online
     - Less than €5 a week
     - €5–€9 a week
     - €10–€20 a week
     - €21–€50 a week
     - €51–€100 a week

- €101–€200 a week
- More than €200 a week

– In person at a bookmaker's, or over the phone
  - Less than €5 a week
  - €5–€9 a week
  - €10–€20 a week
  - €21–€50 a week
  - €51–€100 a week
  - €101–€200 a week
  - More than €200 a week

b) Spread betting (e.g., on shares or foreign currencies)
  - Less than €5 a week
  - €5–€9 a week
  - €10–€20 a week
  - €21–€50 a week
  - €51–€100 a week
  - €101–€200 a week
  - More than €200 a week

e) Lottery tickets
– Online
  - Less than €5 a week
  - €5–€9 a week
  - €10–€20 a week
  - €21–€50 a week
  - €51–€100 a week
  - €101–€200 a week
  - More than €200 a week

– In person
  - Less than €5 a week
  - €5–€9 a week
  - €10–€20 a week
  - €21–€50 a week
  - €51–€100 a week
  - €101–€200 a week
  - More than €200 a week

f) Scratch cards or instant wins
– Online
  - Less than €5 a week
  - €5–€9 a week
  - €10–€20 a week
  - €21–€50 a week
  - €51–€100 a week
  - €101–€200 a week
  - More than €200 a week

- In person
  - Less than €5 a week
  - €5–€9 a week
  - €10–€20 a week
  - €21–€50 a week
  - €51–€100 a week
  - €101–€200 a week
  - More than €200 a week

g) Bingo
- Online
  - Less than €5 a week
  - €5–€9 a week
  - €10–€20 a week
  - €21–€50 a week
  - €51–€100 a week
  - €101–€200 a week
  - More than €200 a week

- In person
  - Less than €5 a week
  - €5–€9 a week
  - €10–€20 a week
  - €21–€50 a week
  - €51–€100 a week
  - €101–€200 a week
  - More than €200 a week

h) Bets or gambling between friends
  - Less than €5 a week
  - €5–€9 a week
  - €10–€20 a week
  - €21–€50 a week
  - €51–€100 a week
  - €101–€200 a week
  - More than €200 a week

k) The other forms of gambling you have spent money on:
[Text they wrote in open textbox for Q1(j) shown here]
- Online
  - Less than €5 a week
  - €5–€9 a week
  - €10–€20 a week
  - €21–€50 a week
  - €51–€100 a week
  - €101–€200 a week
  - More than €200 a week

- In person
  - Less than €5 a week
  - €5–€9 a week

- €10–€20 a week
- €21–€50 a week
- €51–€100 a week
- €101–€200 a week
- More than €200 a week

Gambling more/less than usual over the last four weeks

How does your gambling over the past four weeks compare to how much you usually gamble?

A lot less than usual; A bit less than usual; The same as usual; A bit more than usual; A lot more than usual.

If any option other than 'the same as usual' is selected:

Can you briefly explain why you have gambled less/more than usual over the past four weeks?

[Open text box]

SECTION D. PROBLEM GAMBLING SEVERITY INDEX

THE ORDER OF SECTIONS C AND D WILL BE RANDOMISED – HALF OF PARTICIPANTS WILL SEE C FIRST AND HALF WILL SEE D FIRST.

Problem Gambling Severity Index (Ferris and Wynne, 2001)

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?

Never	Sometimes	Most of the time	Almost always

2. Have you needed to gamble with larger amounts of money to get the same feeling of excitement?

Never	Sometimes	Most of the time	Almost always

3. When you gambled, did you go back another day to try to win back the money you lost?

Never	Sometimes	Most of the time	Almost always

4. Have you borrowed money or sold anything to get money to gamble?

Never	Sometimes	Most of the time	Almost always

5. Have you felt that you might have a problem with gambling?

Never	Sometimes	Most of the time	Almost always

6. Has gambling caused you any health problems, including stress or anxiety?

Never	Sometimes	Most of the time	Almost always

7. Have people criticised your betting or told you that you had a gambling problem, regardless of whether or not you thought it was true?

Never	Sometimes	Most of the time	Almost always

8. Has your gambling caused any financial problems for you or your household?

Never	Sometimes	Most of the time	Almost always

9. Have you felt guilty about the way you gamble or what happens when you gamble?

Never	Sometimes	Most of the time	Almost always

10. To show you are not a bot, please choose 'Sometimes' for this question.

Never	Sometimes	Most of the time	Almost always

If the participant selects an answer other than 'sometimes' for item 10, they are shown the following message: 'It looks like you failed a check for bots. Please read the following questions carefully' and then presented with the PGSI to redo it. If they fail the attention check again, they are eliminated from the survey.

SECTION E: FRIENDS AND FAMILY

In the next section, we would like to know about your close friends and family. Just to repeat, all of your responses are completely anonymous.

Page 2

Friends gambling (Kang, 2023)

How many close friends do you have?

- ○ 0
- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5
- ○ 6
- ○ 7
- ○ 8
- ○ 9
- ○ 10
- ○ 11
- ○ 11+

If 1 is selected above

Does your close friend gamble? If you don't know, give your best guess.

Yes/No

If 2–10 is selected above:

Of your X close friends, how many of them gamble? If you don't know, give your best guess. (Self-composed)

- 0–X

If 11+ is selected above:

Please think about your 10 closest friends. Of your 10 closest friends, how many of them gamble? If you don't know, give your best guess. (Self-composed)

- 0–10

If one friend gambles. Adapted from Svensson et al. (2013), UK Gambling Commission (2021).

Do you feel that your close friend that gambles has a problem with gambling?

Yes/No

If more than one friend gambles. Adapted from Svensson et al. (2013), UK Gambling Commission (2021).

How many of these Y [10 closest] friends that gamble do you feel has a problem with gambling? 0–Y

Family gambling

How many people are in your immediate family? Your immediate family includes your parents, siblings, partner and children. (Self-composed)

- 0–11+

If 1 is selected above (Self-composed)

Does your immediate family member gamble? If you don't know, give your best guess.

Yes/No

If 2–10 is selected above (Self-composed)

Of your X immediate family members, how many of them gamble? If you don't know, give your best guess.

- 0–X

If 11+ is selected above (Self-composed)

Please think about your 10 **closest** immediate family members. Of your 10 closest immediate family members, how many of them gamble? If you don't know, give your best guess.

- 0–10

If 1 family member gambles. (Self-composed)

What relation to you is this immediate family member that gambles?

- Parent
- Sibling
- Partner
- Child

If more than one family member gambles. (Self-composed)

Of those Y family members who gamble, what relation are they to you? Tick all that apply. Self-composed.

- ☐ Parent
- ☐ Sibling
- ☐ Partner
- ☐ Child

Are you worried about your child(ren)'s gambling? *(Self-composed; Hidden unless states in previous question that they have a child who gambles.)*

1 Not at all	2	3	4	5	6	7 Extremely

If 1 family member gambles. Adapted from Wenzel et al. (2008), Svensson et al. (2013).

Do you feel that your immediate family member that gambles has a problem with gambling?

Yes/No

If more than one family member gambles. Adapted from Wenzel et al. (2008), Svensson et al. (2013).

How many of these Y immediate family members that gamble do you feel has a problem with gambling?

- 0–Y

If 1 family member has problem gambling. (Self-composed)

What relation to you is this immediate family member that you feel has a problem with gambling?

- Parent
- Sibling
- Partner
- Child

If more than one family has problem gambling. (Self-composed)

Of those Y family members that you think might have a problem with gambling, what relation are they to you? Tick all that apply. (Self-composed)

- ☐ Parent
- ☐ Sibling
- ☐ Partner
- ☐ Child

The Problem Gambling Significant Other Impact Scale (PG-SOIS) (Dowling et al., 2014)

In the past 3 months, how often have you experienced any of the following problems as a result of the gambling of a family member or friend?

1. You or your family have experienced financial hardship.

Not at all	Rarely	Sometimes	Often

2. You have experienced feelings of sadness, anxiety, stress or anger.

Not at all	Rarely	Sometimes	Often

3. The quality of your relationship with the other person has been affected.

Not at all	Rarely	Sometimes	Often

4. Your social life has been affected.

Not at all	Rarely	Sometimes	Often

5. Your ability to work or study has been affected.

Not at all	Rarely	Sometimes	Often

6. Your physical health has been affected.

Not at all	Rarely	Sometimes	Often

SECTION F: CHILDHOOD AND TEENAGE EXPERIENCES

This next section is about your childhood experience of gambling. Please think back to any gambling activity you might have engaged in **before you turned 18**. Remember, your responses are completely anonymous and can never be linked to you.

Which of these activities did you spend money on before the age of 18? Tick all that apply. Please do not include any form of gambling that you did not spend money on (e.g., playing card games with friends with no wagers). Adapted from UK Gambling Commission (2021)

- ☐ Betting on horse or dog races
- ☐ Betting on other sports such as soccer, rugby, GAA, golf
- ☐ Spread betting (e.g., on shares or foreign currencies)
- ☐ Lottery tickets
- ☐ Scratch cards or instant wins
- ☐ Bingo
- ☐ Fruit/slot machine style games online or in a physical location (e.g., an arcade, a casino)
- ☐ Roulette, poker, cards or dice online or in a casino
- ☐ Bets or gambling between friends
- ☐ Loot boxes in video games
- ☐ Esports betting (i.e., betting on competitive video game tournaments and matches)
- ☐ Any other form of gambling not described above

If 'Any other form' is selected, an open text box appears: 'Please briefly describe in the box below the other form(s) of gambling you have spent money on in the last four weeks.'

How many of your parents/guardians gambled while you were growing up?

Dropdown options: 0, 1, 2, don't know, not applicable to me

If answers 1

For your parent/guardian that gambled, how often did he/she gamble while you were growing up? Self-composed

1 Very rarely	2	3	4	5	6	7 Always

Did he/she gamble less or more than the average person while you were growing up, do you think? Adapted from UK Gambling Commission (2021)

1 A lot less	2	3	4	5	6	7 A lot more

If answers 2

Think of your parent/guardian who gambled the most while you were growing up.

How often did he/she gamble while you were growing up? (Self-composed)

1 Very rarely	2	3	4	5	6	7 Always

Did he/she gamble less or more than the average person while you were growing up, do you think? Adapted from UK Gambling Commission (2021)

1 A lot less	2	3	4	5	6	7 A lot more

To what extent do you agree or disagree with the following statement:

While I was growing up, my parents/guardians approved of gambling (Delfabbro and Thrupp, 2003)

1 Strongly disagree	2	3	4	5	6	7 Strongly agree

☐ Click here if you don't know or if this is not applicable to you

SECTION G. PERCEPTIONS AND ATTITUDES

The next section is about your thoughts about gambling more generally. There are no right or wrong answers.

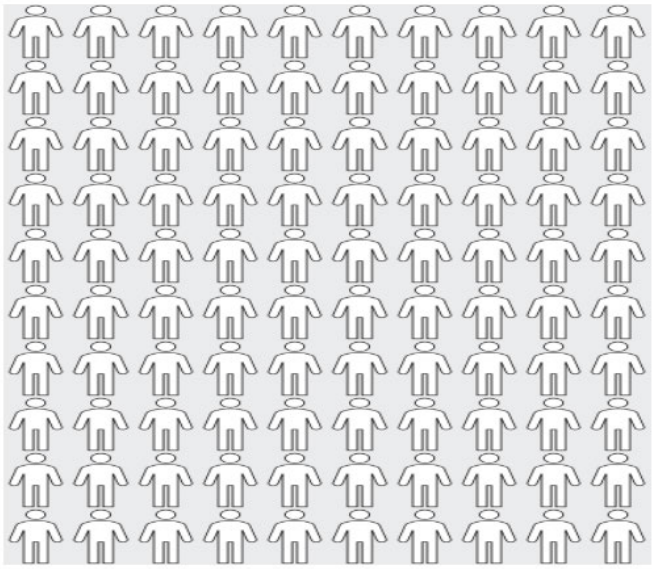
Perceived descriptive norm – Adapted from Robertson et al. (2023)

The picture below shows 100 figures. Imagine the figures represent all the adults in Ireland.

How many adults in every 100 do you think spent more money on gambling than you did in the last four weeks?

When you click on one figure, it and all of the ones before it will turn blue. The number of figures in blue represents your estimate of the number of adults in every 100 who spent more money on gambling than you did in the last four weeks.

You can click as many times as you want, when you are happy with your choice click the confirm button.



When confirm is clicked, the following message appears:

You said that 66 in every 100 adults in Ireland spent more money on gambling than you did in the last four weeks. Are you happy with your answer? No, go back / Yes, continue

Preference for own gambling level (self-composed)

What do you think about your current level of gambling?

I would like to gamble less than I currently do.	I am fine with my current level of gambling.	I would like to gamble more than I currently do.

General attitudes towards gambling – Attitudes Towards Gambling Scale (ATGS-8) (Canale et al., 2016; Orford et al., 2009)

Please state the extent to which you agree or disagree with each of the following statements:

1. People should have the right to gamble whenever they want.

1 Strongly disagree	2	3	4	5 Strongly agree

2. There are too many opportunities for gambling nowadays.

1 Strongly disagree	2	3	4	5 Strongly agree

3. Gambling should be discouraged.

1 Strongly disagree	2	3	4	5 Strongly agree

4. Most people who gamble do so sensibly.

1 Strongly disagree	2	3	4	5 Strongly agree

5. Gambling is dangerous for family life.

1 Strongly disagree	2	3	4	5 Strongly agree

6. On balance, gambling is good for society.

1 Strongly disagree	2	3	4	5 Strongly agree

7. Gambling livens up life.

1 Strongly disagree	2	3	4	5 Strongly agree

8. It would be better if gambling was banned altogether.

1 Strongly disagree	2	3	4	5 Strongly agree

Stigma scale – Adapted from Hing et al. (2016); Martin et al. (2000)

In general, how comfortable would you be with:

- Moving next door to a person who has a problem with gambling

1 Very uncomfortable	2	3	4	5 Very comfortable

- Making friends with a person who has a problem with gambling

1 Very uncomfortable	2	3	4 Very comfortable

- Spending an evening socialising with a person who has a problem with gambling

1 Very uncomfortable	2	3	4 Very comfortable

- Starting working closely on the job with a person who has a problem with gambling

1 Very uncomfortable	2	3	4 Very comfortable

- Having a treatment centre for people who have problems with gambling opened in your local area

1 Very uncomfortable	2	3	4 Very comfortable

- Having a person who has a problem with gambling marry into your family.

1 Very uncomfortable	2	3	4 Very comfortable

Perceived causes – Items 1–6 taken from Hing et al., 2016; Link et al., 1999, items 7–10 self-composed – Inspired by Robertson et al. (2023)

ORDER IN WHICH ITEMS ARE PRESENTED WILL BE RANDOMISED.

In general, how likely do you think it is that a person's gambling problems are caused by:

1. Their bad character

1 Very unlikely	2	3	4	5 Very likely

2. A chemical imbalance in the brain

1 Very unlikely	2	3	4	5 Very likely

3. Stressful circumstances in their life

1 Very unlikely	2	3	4	5 Very likely

4. A genetic or inherited problem

1 Very unlikely	2	3	4	5 Very likely

5. God's will

1 Very unlikely	2	3	4	5 Very likely

6. The way they were raised

1 Very unlikely	2	3	4	5 Very likely

7. The people they socialise with

1 Very unlikely	2	3	4	5 Very likely

8. The widespread availability of opportunities to gamble

1 Very unlikely	2	3	4	5 Very likely

9. Exposure to advertising and promotion of gambling

1 Very unlikely	2	3	4	5 Very likely

10. Treatment services being unavailable or inadequate

1 Very unlikely	2	3	4	5 Very likely

SECTION H: QUESTIONS TO BENCHMARK SAMPLE COMPOSITION AGAINST

We will compare prevalence estimates of smoking etc. in our sample to estimates from other nationally representative surveys to check the representativeness of our sample.

Thank you for your responses. We have now finished the questions about gambling. This final section is about other aspects of your day-to-day behaviour and your background. There are no right or wrong answers.

Smoking – From *Healthy Ireland Survey 2022* (Department of Health, 2023)
Do you smoke tobacco products?

- Yes, daily
- Yes, occasionally
- No

Online shopping – From *Information and Communications Technology Household Survey 2022* (CSO, 2022)

A. Do you use the internet every day or almost every day?

1. Yes
2. **No**

If No:

A1. On average how often do you use the internet?

1. At least once a week but not every day
2. Less than once a week but within the last 3 months
3. Last used it between 3 months and a year ago
4. Last used it more than a year ago
5. Never used it

If Yes to A.; or 1, 2 or 3 to A1:

When did you last buy or order goods or services for private use over the internet?

1. Within the last 3 months
2. Between 3 months and a year ago
3. More than 1 year ago
4. Never bought or ordered over the internet.

Radio listening – From JNLR Survey 2023 (Ipsos MRBI, 2023)

We are going to ask you now about listening to the radio. By listening we mean all types of listening:

- on a radio at home or in the car
- on a computer or laptop
- on a mobile phone or tablet
- on an app
- on a smart speaker (such as *Alexa, Amazon Echo, Google Home*)
- on a TV.

It also means listening anywhere –

- at home
- in the car
- at work or in some other place.

It also means listening to any part of any programme, no matter how long or short a time you listen.

Now tell us, when did you last listen to or hear anything on the radio? Remember, by listening or hearing, we mean ALL types of listening on any type of device.

1. Today
2. Yesterday
3. Longer ago
4. Can't recall.

If 1

(a) Apart from today, when did you last listen to or hear anything on the radio?

1. Yesterday
2. Longer ago
3. Can't recall.

Note that the following question will not be used to benchmark the sample composition, but is included in this section for convenience.

Mental health Inventory – 5 (Berwick et al., 1991; Veit and Ware, 1983)

During the past 4 weeks, how much of the time have you…

- Been a happy person
- Felt calm and peaceful
- Been a very nervous person
- Felt downhearted and blue
- Felt so down in the dumps that nothing could cheer you up

All of the time; Most of the time; A good bit of the time; Some of the time; A little of the time; None of the time.

SECTION I: SOCIODEMOGRAPHICS

Background questions

Thank you for your responses so far. Please answer the following questions about yourself.

Remember that all responses are anonymous – it will not be possible to identify you individually.

How old are you (in years)?

Dropdown 18–100.

Where were you born?

Ireland, Other (please specify).

What is your nationality?

Irish, Other (please specify).

What is your ethnicity?

White Irish; White Irish Traveller; Any other white background; Black or Black Irish – African, Black or Black Irish – any other black background; Asian or Asian Irish – Chinese, Asian or Asian Irish – Any other Asia background; Other including mixed background.

What county do you live in?

Dropdown menu

Which of the following best describes the area you live in?

Urban, Rural

How many people, including yourself, live in your household?

Are there any children under the age of 18 living in your household?

Yes/No

What is your marital status?

> Single, married, unmarried but cohabiting (i.e., living with your partner), separated, divorced, widowed.

What is your employment status?

> Full-time employed, part-time employed, self-employed, homemaker or carer, retired, student, seeking employment or unemployed, unable to work.

What is the highest level of educational attainment?

> Less than Junior Certificate, Junior Certificate or equivalent, Leaving Certificate, technical or vocational certificate, diploma, degree, masters, doctorate.

What is your current employment status?

> Employed full-time, employed part-time, self-employed, homemaker/carer, seeking employment/unemployed, retired, student, unable to work

Approximately, what is your household's gross income per year? (I.e., before paying any tax.) Consider all income sources including social welfare, pensions, etc. (Note: If you are living in a shared household, for example renting with others, or you are living with parents but are financially independent, do not include the income of these others in your answer.) Your answers are anonymous and cannot be linked to you.

> Up to €22,000; €22,001–€32,000; €32,001–€42 000; €42,001–€55,000; €55,001–€67,000; €67,001–€85,000; €85,001–€105,000; €105,001–€137 000; Above €137,000; Prefer not to say or don't know.

SECTION J: WRAP-UP QUESTIONS AND DEBRIEF

Before you finish the survey, it would be very helpful if you let us know whether you experienced any difficulty during your participation.

Please tell us if anything was unclear or any of the questions were difficult to answer.

[Open text box]

Is there any reason why your data may not be usable for analysis? Note that your response to this question will not affect your payment.

[Open text box]

Debrief

Thanks for completing our survey. If you think that you or someone you know suffers from problem gambling, support is available from GamblingCare.ie:

https://gamblingcare.ie/

Freephone: 1800 936 725

For general mental health, support services are listed on the HSE website at:

https://www2.hse.ie/mental-health/services-support/supports-services/.

You can also talk to a GP or call the HSE YourMentalHealth Information Line on (freephone) 1800 111 888.

Whitaker Square,
Sir John Rogerson's Quay,
Dublin 2
Telephone **+353 1 863 2000**
Email **admin@esri.ie**
Web **www.esri.ie**
Twitter **@ESRIDublin**

INSTITIÚID TAIGHDE EACNAMAÍOCHTA AGUS SÓISIALTA
ESRI ECONOMIC & SOCIAL RESEARCH INSTITUTE

Measures of Problem Gambling, Gambling Behaviours and Perceptions of Gambling in Ireland Summary

MEASURES OF PROBLEM GAMBLING,GAMBLING BEHAVIOURS AND PERCEPTIONS OF GAMBLING IN IRELAND (esri.ie)

Methodology Summary

- Main aim to measure prevalence of PG. Secondary aim in providing measures of gambling activity and perceptions of gambling among the general population.
- Used quota sampling using 3 different online panels. Created a total sample of 2850 adults aged 18 and over.
- Online survey method
- Reweighted responses by age, gender, educational attainment based on census 2022 figures to improve representativeness – as use of online panels and sampling method does not generalise to people without internet access those who are over 80 years of age or individuals without the capacity to complete surveys in English.
- Used 2 indirect questioning techniques – crosswise model and list technique.
- To reduce social desirability bias in this study, estimated the prevalence of PG by administering the PGSI online; and then deployed the two indirect questioning techniques, as well as the NSUM method, to give additional indications of the likely accuracy of our estimates.
- The Network Scale-Up Method (NSUM) allows hard-to-count populations to be estimated by asking survey participants how many people there are in their social network who fit the description of interest.

Findings Summary

- Recorded that 3.3% of the adult population have PG (With a 95% confidence interval of 2.5–4.0%). Higher than previous reporting of PG in Ireland (previously 0.3%). A further 7.1% estimated to be in the 'moderate evidence' category.

TABLE 3.1 PROPORTION IN EACH PGSI CATEGORY (%)

	Problem gambling	Moderate evidence	Some evidence	No evidence
Prevalence	3.3	7.1	15.0	74.7
Lower CI	2.5	6.0	13.4	72.8
Upper CI	4.0	8.2	16.5	76.5

Notes: Weighted estimates. N=2,850. CI=Confidence interval. Problem gambling is defined as a score of 8 or above out of 27 on the PGSI, with moderate evidence defined as a score of 2–7 and some evidence a score of 0 or 1.

- Explained to be higher due to the different methodology as previous estimates were taken from a face-to-face survey (National Drugs and Alcohol Survey – 0.3%). Answering questions privately and online gives more anonymity and therefore participants more willing to admit to problem gambling behaviour.
- Recent research with senior intercounty Gaelic Athletic Association (GAA) players, which involved administering the PGSI via an anonymous, online survey, recorded a PG prevalence rate of 4.7% (Turk et al., 2023) – further support of online survey method.
- Descriptive statistics show that while PG is more common among adults aged under 50, men, and those with lower educational attainment, it is also prevalent among women and those

with higher educational attainment. The sample suggests that 3.6% of men and 2.9% of women have PG.

- A high proportion of people with PG (above 4%) among all age groups are under 50 years, with the highest proportion among the 30–39 age group. There is a sharp drop-off in PG after age 50.
- With respect to gambling activity in the general population, 74% reported engaging in any form of gambling over the previous four weeks and 35% reported gambling online.
- Most common forms of gambling are lotteries and scratch cards, followed by betting on horses, dogs and other sports. Casinos and spread betting are the least common forms.
- Those with PG reported engaging with slot machines and casino gambling more often than those without, particularly online.
- Gender differences in activity - men are more likely to gamble online than women.
- Also found men are more likely to spend money on horse and dog betting and sports betting, while women are more likely to play bingo and to play slot machines in person.
- They do not report a gender-based comparison of PG due to low sample sizes.

TABLE 3.7 PROPORTION THAT SPENT MONEY ON GAMBLING IN THE PREVIOUS 4 WEEKS

	All modes	Online	In person
All types	74.1	35.1	60.9
All except gambling between friends	73.6	35.1	59.6
Lotteries	55.9	16.8	43.6
Scratch cards	35.3	5.6	31.4
Horse and dog betting	17.1	11.1	8.8
Sports betting	16.0	12.7	5.4
Bingo	8.4	2.5	6.3
Gambling between friends	6.6	–	6.6
Slot machines	6.2	3.3	3.3
Casino gambling	3.7	3.1	0.9
Spread betting	1.7	1.7	–
Other	2.9	2.3	0.7

Notes: Weighted estimates. Full sample N=2,850 (including both those who did and did not gamble in the previous four weeks). Spread betting refers to betting on the value of an (unowned) asset.

- PG reported spending, on average, more than €1,000 per month on gambling. This group accounted for 28% of total spending on gambling.
- Two-thirds of people with PG state that they would like to gamble less than they currently do.
- Multiple robustness checks carried out. The results were not sensitive to how sociodemographic weights were applied or to reweighting based on behavioural variables against probability samples.
- Argued unlikely to be over reporting gambling behaviour, due to the estimates of total spend coming from responses, falling below estimates of total industry revenue.
- Estimated total annual spending of 5.5 billion euros. Compared to industry revenue estimate of 6-8 billion euros. Therefore, questioning if it is possible to overestimate PG and simultaneously underestimate expenditure.
- Used NSUM method to a question about whether close friends have a problem with gambling – which provided a figure of 3.2% based of perceptions of a friend's gambling behaviour, very close to the reported new PG rate. Therefore, showing the estimates of the prevalence of PG are in line with perceptions among the public at large about the extent of PG in their social networks. Provides further helpful validity of the data.
- This data also helps with justifying sample selection by online panels, and for it not to be a reason of a high PG as this would require not only that people with PG are many times more

likely than the rest of the population to join online panels, but also that people who have friends with PG are very much more likely to join online panels.

- The conclusion is that while it was recorded only 3.3% of the adult population as having PG, this group accounts for an estimated 28% of spending on gambling, with 47% of total spending accounted for by a combination of people with PG and those with moderate evidence of PG. With robustness tests and different methodology, it is likely that a higher PG rate is a more reliable one.

From: [redacted]
To:
Subject: RE: PG in Ireland Report - Summary
Date: 18 October 2023 11:20:00
Attachments: image001.png
image002.jpg
image003.png

No problem at all, was a good read!

From: [redacted]@gamblingcommission.gov.uk>
Sent: Wednesday, October 18, 2023 9:23 AM
To: [redacted]@gamblingcommission.gov.uk>; [redacted]@gamblingcommission.gov.uk>
Subject: RE: PG in Ireland Report - Summary

Hi [redacted]

I don't think I said thank you for pulling this together, but it's really helpful thank you.

I have saved a copy on the AllDrive for future ref PG in Ireland Summary.docx

I am also going to share with [redacted] as she is taking part in a webinar in Ireland at end of November and was asking for some up to date info on PG rates in Ireland.

Thanks

[redacted]

From: [redacted]@gamblingcommission.gov.uk>
Sent: Tuesday, October 10, 2023 10:52 AM
To: [redacted]@gamblingcommission.gov.uk>; [redacted]@gamblingcommission.gov.uk>
Subject: PG in Ireland Report - Summary

Hi both,

Following the article about the increased problem gambling rate in Ireland, I've done a brief summary of the report .

Here's the link to the full report for reference:
MEASURES OF PROBLEM GAMBLING,GAMBLING BEHAVIOURS AND PERCEPTIONS OF GAMBLING IN IRELAND (esri.ie)

Thanks,
[redacted]

[redacted]

www.gamblingcommission.gov.uk

Effects of Inducements on Sports Gambling and Decision-Errors

Study aim

To examine how gambling inducements (e.g. free bets and money-back offers) affect betting behaviour and decision-making errors.

Methodology

- 622 males aged under 40.
- Participants completed six betting tasks on real Euro 2024 matches
- For each task, they could bet any amount (up to €10) on one of six outcomes (home win, draw, or away win for two matches) or choose not to bet.
- Online experiment with a 2x2 design:
    - Inducement condition: participants either provided with inducement offer, or no inducement offer.
    - Odds condition: participants were offered either market+ odds or low odds.
        - Participants in the Market+ odds condition were offered bets that had positive expected values (EVs)
        - Participants in the low odds condition were offered bets that had EVs (“bad bets”)
- Participants in the inducement offer condition saw three inducements:
    - A free €5 bet after task 1
    - A "moneyback" offer on task 3 (refund if the match was drawn)
    - A conditional free bet on task 6 (bet on one team to receive a free bet on another match)

Primary outcome measures

- Amount bet per task
- Whether or not they decided to bet

Other measures of interest

- Understanding of T&Cs, PGSI, mental health, past gambling behaviour.
- Betting behaviour was measured across multiple tasks, with some inducements deliberately tied to poor-value bets

Analysis

- MLM regressions (to account for multiple observations per participant).

- Models looked at predictive ability of inducements on:
- Amount bet
- Decision to accept bad bets

Re-ran regression models controlling for sociodemographic variables and other relevant gambling behaviours.

Key Findings

- **Increased betting**: Inducements increased the amount spent on bets by over 10% and almost halved the number of people choosing not to bet.
- **Decision errors**: When inducements were tied to "bad bets" (i.e. worse expected value than alternatives), participants were 3x more likely to choose these poor-value options.
- **Problem gambling vulnerability**: The effect of inducements was stronger for people with higher Problem Gambling Severity Index (PGSI) scores. Found an inverse U-shape pattern in which inducement effects were strongest for those with moderate PGSI.
- **Poor understanding of terms**: Most participants had poor comprehension of the T&Cs of inducements. Many participants overestimated the value of free bets.

Found that gambling inducements:

- increase financial losses for consumers and raise profits for operators
- Disproportionately affect people with higher PGSI scores
- Lead to decision errors and expose consumers to "behavioural exploitation"
- Are widely misunderstood even by regular bettors

Findings support restrictions on gambling inducements. Evidence shows that they could be detrimental to the consumer.

Childhood Gambling Experiences and Adult Problem Gambling

Study aim

To examine the relationship between childhood gambling experiences and PG in adulthood.

Methodology

- online survey of 3,000 adults in Ireland conducted in July-August 2023
    - After exclusions, final sample size was 1,663

Primary measures

- PGSI
- Early experiences of gambling:
    - **Gambling before age 18**: Participants reported which forms of gambling they had spent money on before turning 18
    - **Parental gambling**: Participants reported how many parents gambled during their childhood (0, 1, or 2)
    - **Intensity of parental gambling**: For those who had at least one parent who gambled, participants rated:
        - How often their parent gambled (7-point scale)
        - How much their parent gambled compared to average (7-point scale)
- **Parental attitudes**: Participants rated their agreement with the statement "While I was growing up, my parents/guardians approved of gambling" (7-point scale)

Other measures of interest included:

- Gambling spend: Amount spent on gambling per week over the previous month
- Attitudes toward gambling (Attitudes Towards Gambling-8 scale)
- Sociodemographic variables: Gender, age, education, nationality, ethnicity, location

Key Findings

- **Childhood gambling is common**:
    - 64% of adults reported gambling before age 18.
    - The most common forms were slot machines (33%), scratch cards (31%), and horse/dog betting (27%).

- **Strong links to adult problem gambling**:
    - People who gambled before age 18 were almost twice as likely to have PG as adults
    - Those who had a parent who gambled with high intensity were also almost twice as likely to have PG
    - Parents with positive attitudes toward gambling increased their children's PG risk by approx one-third

- **Parental influence is changing**:
    - The relationship between parental gambling behaviour and adult PG was stronger for people over 40 compared to younger adults.
        - Could suggest that other factors like increased gambling accessibility/marketing may now play a larger role.
- **Other predictors of PG**:
    - The forms of underage gambling most strongly associated with adult PG were:
        - gambling among friends,
        - sports betting,
        - casino gambling,
        - e-sports betting,
        - loot boxes,
        - spread betting.
- **Potential gateway effect**:
    - Found that high-prevalence gambling forms (slots, scratch cards) were associated with more niche forms that are more strongly associated with PG. Suggests possible gateway effects.

Policy Implications

Findings support regulatory measures to minimise children's exposure to gambling, including:

- Age verification safeguards
- Restrictions on gambling marketing targeting children
- Watershed bans on TV advertising
- Regulation of sponsorships involving children
- Protecting parents from PG to indirectly help children

Problem Gambling: A Narrative Review of Important Policy-Relevant Issues

Research aims

To provide a comprehensive review of research on problem gambling to inform policy development.

Methodology

- Narrative review
- Inclusion criteria:
    - Studies with gambling industry connections were handled carefully - those not published in peer-reviewed academic journals were excluded
    - Studies with industry connections that were published in peer-reviewed journals were included but marked with an asterisk
- Scope of review covered:
    - Prevalence measurement methods
    - Risk factors and associated behaviours
    - Marketing effects
    - Intervention effectiveness
    - Gambling amongst young people

Key findings

Prevalence of Problem Gambling

- In Ireland, the latest estimates of PG prevalence are 0.3 per cent (12,000 people), with 0.9% (35,000) at moderate risk and 2.3% (90,000) at low risk
- These figures are likely underestimates due to methodological issues with surveys and social desirability bias

Risk Factors

- PG is more prevalent among men, younger people, disadvantaged groups, and those with other addictions or mental health issues
- Environmental factors include greater availability and social acceptability of gambling
- High-frequency, fast-payout gambling forms (online gambling, casino games, electronic gaming machines) show the strongest association with PG

Marketing and Advertising

- exposure to gambling advertising increases gambling behaviour
- Issues identified include:
    - demographic targeting of advertisements, unavoidable advertising, financial incentives to bet, and complex bets
- Complex bets (those with many possible outcomes) often exploit cognitive biases in people's probability judgments

Interventions

- interventions such as limit-setting tools and personalised feedback have shown effectiveness
- evidence for educational interventions is mixed
- Therapeutic interventions (particularly CBT) are effective for treating problem gambling
- Effectiveness of pharmacological interventions lack sufficient evidence

Youth-Specific Concerns

- Social casino games are associated with problem gambling and may act as a gateway, particularly for young people
- Loot boxes in video games have similar characteristics to gambling and show correlations with PG
- Other concerns include:

    - 1) exposure to gambling advertising on social media and
    - 2) inadequate age verification on gambling websites

Further research needed to inform policy development/regulatory interventions

- Need for improved prevalence estimates using innovative techniques to overcome social desirability bias
- Sparse survey evidence on public attitudes toward gambling
- Need for behavioural audits of marketing techniques in Ireland
- Lack of pre-testing of specific interventions in the Irish context
- More research needed on social casino games, loot boxes, and other youth-related issues

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Measures of Problem Gambling, Gambling Behaviours and Perceptions of Gambling in Ireland

Research aims

To measure the prevalence of problem gambling (PG) in Ireland more accurately than previous studies.

Methodology

- online survey with 2,850 adults.
- Questions included:
    - PGSI
    - Gambling participation (frequency, types, spend, online vs in person gambling)
    - Attitudes Towards Gambling Scale
    - Mental Health Inventory-5 (MHI-5)
    - Perceived causes of problem gambling
    - Problem Gambling Significant Other Impact Scale

Experimental Design Elements

- Question order was randomised (gambling behaviour vs. PGSI questions) to test if making gambling behaviour questions more salient affected responses
- Different incentive structures were used to detect potential selection effects

Key findings

- 3.3% of adults in Ireland have PG (equates to about 130,000 people). This is more than ten times higher than previous estimates (0.3%) from face-to-face surveys.
- An additional 7.1% (279,000 people) show moderate evidence of PG, and 15% (590,000 people) show some evidence.

Gambling Behaviour and Expenditure

- 74% of adults reported gambling in the previous four weeks
- 35% gambled online, while 61% gambled in person
- The most popular forms were lotteries and scratch cards
- People with PG spent an average of €231 per week (€12,000 per year) on gambling
- People with PG account for 28% of all gambling expenditure
- People with PG or moderate evidence of PG account for 47% of all gambling expenditure

Demographic Patterns

- PG is more common among those under 50. Highest rates (6.7%) in the 30-39 age group
- Men have higher rates (3.6%) than women (2.9%)
- PG is more prevalent among those with lower educational attainment
    - However, 2.6% prevalence among those with degrees

Attitudes and Perceptions

- 67% of people with PG wish they gambled less than they currently do
- The public views the availability of gambling opportunities/advertising as main causes of PG
- Gambling is viewed negatively by most of the public
- There is evidence of stigma toward people with PG
- People with PG have substantially worse mental health than others

Policy Implications

Findings support measures proposed in Ireland's Gambling Regulation Bill, including:

- Restrictions on gambling marketing and advertising
- Pre-set limits on expenditure

- Restrictions on gambling via credit
- Increased provision of support services