



Office for Health  
Improvement  
& Disparities

# **The economic and social cost of harms associated with gambling in England**

**Evidence update 2023**

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# Contents

Abbreviations .....	4
Executive summary .....	5
2023 update .....	5
Introduction.....	5
Costing gambling-related harms.....	6
Recommendations.....	9
1. Introduction .....	11
1.1 Updating the 2021 report.....	11
1.2 Current evidence on the economic and social costs of harmful gambling .....	12
2. Methods .....	16
2.1 Population of analysis.....	16
2.2 Perspective of analysis and types of costs .....	20
2.3 Approach to estimating costs.....	27
2.4 Timelines of analysis .....	28
2.5 Approach to uncertainty.....	28
2.6 Association v causation .....	29
3. Financial harms .....	31
3.1 Cost to the individual .....	31
3.2 Homelessness cost to government.....	34
4. Health harms .....	39
4.1 Suicides .....	40
4.2. Depression .....	47
4.3. Alcohol dependence .....	55
4.4. Illicit drug use.....	59
4.5. Direct quality of life impacts .....	63
4.6. Gambling treatment .....	64
5. Employment and education harms .....	66
5.1 Introduction.....	66
5.2 Methodology .....	67
5.3 Results .....	70
5.4 Limitations .....	70

6. Criminal activity.....	72
6.1 Introduction.....	72
6.2 Methodology.....	73
6.3 Results.....	74
6.4 Limitations.....	75
7. Discussion.....	77
7.1 Estimated excess cost of harm associated with gambling.....	77
7.2 Sensitivity analysis.....	82
7.3 Limitations and recommendations for future research.....	86
8. Conclusions.....	89
9. Interests and acknowledgements.....	91
9.1 Authors.....	91
9.2 Competing interests.....	91
9.3 Funding.....	91
9.4 Acknowledgements.....	91
Appendix A. Literature review methodology.....	93
Appendix B. Cost of gambling framework.....	96
Appendix C. Data sources of harms and costs on gambling.....	97
Appendix D. Further details of the methodology.....	100
Population of analysis.....	100
Suicide analysis.....	106
Homelessness analysis.....	107
Employment harms analysis.....	108
References.....	109

# Abbreviations

ACC	Alternative Claims Count database
AOR	Adjusted odds ratio
AUD	Australian Dollar
CI	Confidence interval
COI	Cost of illness
DCMS	Department for Digital, Culture, Media and Sport
DfT	Department for Transport
DHSC	Department of Health and Social Care
DLUHC (formerly MHCLG)	Department for Levelling Up, Housing and Communities
DSM	Diagnostic and Statistical Manual of Mental Disorders
DWP	Department for Work and Pensions
EGM	Electronic gaming machine
GD	Gambling disorder
GDP	Gross domestic product
GGY	Gross gambling yield
GMCA	Greater Manchester Combined Authority
HMT	His Majesty's Treasury
HO	Home Office
HSE	Health Survey for England
ISA	Individual savings account
JSA	Jobseeker's Allowance
MHCLG	Ministry of Housing, Communities and Local Government
MOJ	Ministry of Justice
NDTMS	National Drug Treatment Monitoring System
NICE	National Institute for Health and Care Excellence
OCU	Opiate and/or crack cocaine use
OECD	Organisation for Economic Co-operation and Development
OHID	Office for Health Improvement and Disparities
ONS	Office for National Statistics
OR	Odds ratio
PG	Problem gambling
PGSI	Problem Gambling Severity Index
PHE	Public Health England
PSSRU	Personal Social Services Research Unit
QALY	Quality-adjusted life year
QOF	NHS Digital's Quality and Outcomes Framework
QoL	Quality of life
RR	Relative risk
SMR	Standardised mortality ratio
UKHSA	UK Health Security Agency
YLL	Years of life lost

You can find a full list of definitions and technical terms in the [gambling review glossary](#).

# Executive summary

## 2023 update

The gambling-related harms evidence review was published by Public Health England (PHE) in September 2021, including this economic and social cost of harms report. PHE has since been disestablished. The Office for Health Improvement and Disparities (OHID) has carried out a review and update of the work, with the aim of continuing to improve our methodology. This is a standard approach for previously published reports, and it includes an update of all the areas of analysis to reflect the current price year. This report is an updated version of the 2021 publication.

For all cost estimates, we undertook a technical quality assurance (QA) process and made some minor improvements to the methodology. We carried out a full review of the methodology for the suicide and depression estimates, given these have the largest contribution to the overall cost. For these 2 areas, we convened an expert panel to advise on changes to the methodology. The panel was made up of:

- health economists
- academics who specialise in the impacts of gambling
- academics who specialise in mental health conditions

The evidence we had used as inputs to estimate the relationship between gambling, suicide and depression were all examined and improvements made. We also included new analysis on the health impacts of depression.

## Introduction

This report brings together evidence on gambling prevalence, harms and costs to estimate the annual economic burden of harmful gambling in England. It builds on previous reports in this area, such as Thorley and others (1, 2), that estimated the cost to government associated with problem gambling in Great Britain (England, Wales and Scotland). It also makes use of the evidence collected in the other elements of PHE's [gambling-related harms review](#). The goal of this analysis is to estimate the financial costs to government and the societal value of the health impacts associated with gambling-related harm experienced by the English population classified as gambling at levels of elevated risk and problem gambling. This has been subject to data availability.

## Costing gambling-related harms

Table 1 shows our estimate that the annual excess direct financial cost to government associated with harmful gambling is equivalent to £412.9 million. It also shows that our estimate for the annual societal value of health impacts is equivalent to between £635 and £1,355.5 million (in 2021 to 2022 prices). This provides a combined estimate of approximately £1.05 to £1.77 billion.

We have provided a range for the wider societal costs, as this includes the estimated societal cost of suicides associated with harmful gambling. We have presented this cost as a range, following advice from the expert panel we convened for this update. They recommended this approach to better represent the uncertainty around the costs of suicide. The size of the range reflects the limits of the evidence available as well as the sensitivity of the costs to small changes in the number of deaths by suicide.

The analysis refers to harmful gambling, which includes individuals screened as 'low-risk', 'moderate-risk' (which are often combined and referred to as 'at-risk') and 'problem gamblers' using the Problem Gambling Severity Index (PGSI). The Health Survey for England (HSE) estimates there are about 1.76 million people participating in harmful gambling in England and of these, about 168,000 people are classified as experiencing problem gambling (3). The PGSI defines people experiencing problem gambling as those who gamble to a degree that compromises, disrupts or damages family, personal or recreational pursuits (and is indicated by scoring 8 or more on the PGSI). In the case of the suicide analysis, we also use the DSM-IV criteria, from the Diagnostic and Statistical Manual of Mental Disorders, fourth edition, which is an alternative instrument for identifying harmful gambling.

The national and international evidence base in this area is limited. The analysis aims to cover both people gambling at levels of elevated risk and those experiencing problem gambling, but evidence quantifying harms for both groups is very limited. Other data limitations mean that we have been unable to cost all the tangible and intangible costs associated with harmful gambling. So, these results are considered by OHID and the expert panel to be underestimates of the true cost. There are further financial costs to government (for example, healthcare costs associated with suicide and suicide attempts) and societal health impacts of harmful gambling (for example, the health and wellbeing impacts on families of those experiencing harmful gambling) that have not been possible to quantify.

Looking from a wider societal perspective, there are a range of costs that have not, or have only been partially quantified here (such as crime, education, cultural harms, impacts on relationships and wider impacts on the families of gamblers). For these reasons, we believe the figures of £412.9 million and £635 to £1,355.5 million to be an underestimate of the true scale of the total economic burden associated with harmful gambling.

**Table 1. Estimated excess cost of harm associated with gambling in England, by type of harm and type of cost**

Type of harm (or domain)	Sub-domain	Cohort	Government (or direct) costs (£ millions)	Wider societal (or intangible) costs (£ millions)	All costs (£ millions)
Financial	Statutory homelessness	Adults	£49.0	N/A	£49.0
Health	Deaths from suicide	Adults	N/A	£241.1-£961.7	£241.1-£961.7
Health	Depression	Adults	£114.2	£393.8	£508.0
Health	Alcohol dependence	Adults	£3.5	N/A	£3.5
Health	Illicit drug use	17 to 24 years	£1.8	N/A	£1.8
Total health harms	All health sub-domains	All health cohorts	£119.5	£635.0-£1,355.5	£754.4-£1,475.0
Employment and education	Unemployment benefits	Adults	£77.0	N/A	£77.0
Criminal activity	Imprisonment	Adults	£167.3	N/A	£167.3
Excess cost (£ millions)	All sub-domains	All cohorts	£412.9	£635.0-£1,355.5	£1,047.8-£1,768.4

Notes: Figures may not sum due to independent rounding. N/A means that analysis was not undertaken.

Given the data limitations, it has not been possible to cost individual financial harms to gamblers or affected others (the family and closest network of people participating in harmful gambling). While this is a cost that is outside the perspective of this analysis, research suggests that this is one of the most important individual harms arising from gambling, with significant private costs to gamblers themselves, their families and friends. One recent study showed that gambling activity is associated with:

- financial distress
- lower financial inclusion (not being able to access useful and affordable financial products and services)
- poor or lack of financial planning (4)

Also, spending more money on gambling is associated with smaller:

- amounts spent on insurance and mortgage repayments
- total savings
- pension contributions

Acknowledging these limitations, our analysis has made use of the best available evidence. For health harms, we have taken evidence from the quantitative analysis and the abbreviated systematic review of harms associated with gambling reports of the [PHE gambling-related harms review](#). For other areas of harm, we have drawn evidence from specific literature searches. Most of the evidence has not attempted to or not been able to establish causal links between gambling and harms. Although we need further research to understand the extent of the causal relationship between harmful gambling and impacts, this research allows us to examine the financial costs to government and the societal value of the health impacts associated with harmful gambling.

This should also be considered alongside the fact that the analysis represents only some of the total costs of harm associated with harmful gambling. This is because we made conservative assumptions in calculating those costs and because there are lots of known harms caused by and associated with gambling we were not able to quantify. This includes costs to the individual, impacts on their family and friends and quality of life impacts beyond depression. These and other unquantified costs are likely to be significant and point towards further areas of research to be explored to better capture the true costs of harms associated with gambling.



## Recommendations

The abbreviated systematic review of harms associated with gambling found a substantial body of evidence (over 300 studies), but the majority of studies were not quantitative or were not in a form conducive to analysis of costs related to harmful gambling. To address the limitations mentioned above and draw more complete estimates of the direct and indirect costs of gambling-related harms, future research in this field should aim to expand the depth and breadth of the evidence base on people experiencing gambling-related harms in England.

In particular, researchers should design longitudinal, quantitative studies that allow for analysis to better assess causality (for example, control for confounders, things that cause both harmful gambling and the costs associated with it).

There are several evidence gaps identified throughout the study but there are 3 areas we recommend be prioritised.

### Financial harms to the individual

The abbreviated systematic review of harms associated with gambling identified a large quantity of evidence of financial harms associated with harmful gambling. In particular, it found that gambling-related debt is a crucial harm (findings echoed by the Muggleton study (4)) and is a mediator for other harms such as relationship problems, physical and mental health problems and crime. But gaps need to be filled to conduct a costing analysis for financial harms to the individual, such as evidence that estimates the extent of financial harm experienced by those engaging in harmful gambling (identified by their PGSI score) compared to those not engaging in harmful gambling. The evidence also needs to show how this is broken down by age, sex, income and other variables, as well as data to estimate the rates of bankruptcies and use of debt services for people who participate in harmful gambling compared with the general adult population.

### Prevalence of gambling related deaths by suicide

Although expert consensus was that our review was using the best available evidence in our estimation of the costs associated with deaths by suicides, more accurate estimates would be possible if the prevalence data on gambling related suicides in England was improved upon. Further evidence could also allow us to estimate the healthcare costs associated with suicidality, as well as other government costs associated with deaths by suicide like coroner's costs. We are aware of a new programme of research to be established in 2024 via the Gambling Commission's use of industry settlement funding that will focus on gambling related suicide, which will hopefully improve the evidence base.

## **Harms to affected others**

Despite a body of evidence of the negative impact on those around a person experiencing harmful gambling identified in the abbreviated systematic review of harms associated with gambling, we were unable to assess the estimated economic and social costs associated with these gambling related harms due to a lack of evidence quantifying the resulting impacts on individual health outcomes. There is a clear need for evidence that quantifies the impact of harmful gambling on affected others, including family members, friends and close associates.

Higher quality evidence in these areas would allow for a closer estimate of the true scale of the total economic burden of harmful gambling.

# 1. Introduction

## 1.1 Updating the 2021 report

The gambling-related harms evidence review was published by Public Health England (PHE) in September 2021, including this economic and social cost of harms report. The Office for Health Improvement and Disparities (OHID) has carried out a review and update of the work, with the aim of continuing to improve our methodology. This kind of review is standard for this type of analysis and includes an update of all the areas of analysis to reflect the current price year. This report is an updated version of the 2021 report.

For all cost estimates, we undertook a technical QA and made some minor improvements to the methodology. We carried out a full review of the methodology for the suicide and depression estimates, given these have the largest contribution to the overall cost. For these 2 areas, we convened an expert panel to advise on changes to the methodology. The panel was made up of:

- health economists
- academics specialising in the impacts of gambling
- academics specialising in mental health conditions

The evidence we had used as inputs to estimate the relationship between gambling, suicide and depression were all examined, and we made improvements. We also increased the scope to include the health impacts of depression.

Since this report was published, PHE has been disestablished. The team that conducted the review of the original report are now analysts in OHID, which is part of the Department of Health and Social Care (DHSC).

Concern about the harms associated with gambling has been increasing in the UK. In response to this, the [2018 to 2019 remit letter](#) confirming PHE's priorities included the request for PHE to "inform and support action on gambling-related harm as part of the follow up to the Department for Digital, Culture, Media & Sport-led review of gaming machines and social responsibility" (5).

In May 2018, the Department for Digital, Culture, Media and Sport (DCMS) published its [response to the consultation on proposals for changes to gaming machines and social responsibility measures](#). In it they announced that "PHE will conduct an evidence review of the health aspects of gambling-related harm to inform action on prevention and treatment" (6).

The aim of this economic study is to estimate the annual economic burden of gambling-related harm in England. We recognise there are a limited number of high-quality studies available on the extent and costs of gambling-related harms. To produce this analysis, we had to draw on multiple sources that measure different elements of gambling harm (including some that are from outside the UK), make assumptions and solicit expert opinion. As such our estimates are considerably more uncertain than analysis produced from, for example, a randomised controlled trial.

Although there are a limited number of high-quality studies available, we believe producing this analysis reduces overall uncertainty around gambling-related harms by bringing together the current best estimates of their scale. Given these harms are extensive, decisions on gambling policy should take them into account and this work helps those decisions be more informed and evidence based. We also hope the work encourages the development of further evidence and improved and expanded analysis on the topic.

This introduction summarises the current evidence on economic and social costs of harmful gambling in the UK and England, as well as other developed countries. We have not conducted any additional reviews of the literature for this updated report, other than a rapid literature search for depression, which is detailed in that section. The methods outline the populations of interest and the general approach to costing gambling-related harm.

We present the main analysis for each type of harm where there was robust evidence available, followed by a discussion of the results. We then present the main conclusions of the report including the updated estimate of financial costs to government and societal value of the health impacts associated with gambling-related harm experienced by the English population classified as gambling at levels of elevated risk and problem gambling.

## **1.2 Current evidence on the economic and social costs of harmful gambling**

### **How we reviewed the evidence**

We conducted a structured literature review to identify the social and economic costs that had been analysed both within the UK and internationally, with a focus on Organisation for Economic Co-operation and Development (OECD) countries. We conducted searches in Ovid MEDLINE and EBSCO Econ Lit using keywords for gambling and its related harms. We screened and selected studies that described relevant economic and social costs. You can find an overview of the literature review method in Appendix A.

We complemented the results from the electronic search with more focused searches and papers identified through an external reference group. The external reference group's role was to inform and guide the project team undertaking the review. We also arranged meetings with

external academic experts working in this area to ensure we identified the main sources of economic evidence related to gambling-related harms.

We used the literature review to gain an overview of the previous work done on the cost of gambling-related harms, as well as using it as a source of evidence for the economic analysis.

The work described above, carried out for the 2021 report, was supplemented by a rapid literature search for the 2023 update. We provide more details in the methods section for the depression analysis (section 4.2).

## UK and English evidence

There have been few attempts to quantify the costs of gambling-related harm in England and the UK. At the time of writing the original report, we found only the Institute for Public Policy Research report 'Cards on the table' (1) that quantified the cost of gambling-related harm from the government perspective within the British context.

Thorley and others (1) estimate the fiscal cost to government of problem gambling in Great Britain (England, Wales and Scotland) in 2015 to 2016. The specific results for England estimate a cost between £200 million and £570 million. These costs include provision of healthcare, unemployment benefits, statutory homelessness and costs related to the criminal justice system.

Gambling-related harms are receiving more attention. The House of Lords Select Committee on the Social and Economic Impact of the Gambling Industry (7) has recently published a report. It says, among other things, wider social impact should be considered when anyone is analysing gambling-related harm. These wider social impacts include:

- financial cost to the individual
- health problems
- the impact on family relationships
- employment
- quality of life

One recent study provides a conceptual framework for the potential gambling-related harms and their social costs in England (8). These impacts include not only the fiscal cost included in Thorley and others (1) but expands on other areas such as relationships (the impacts on partners, family and friends, and the community) and money and debt. These impacts affect the person living with gambling addiction and their close family and carers. The work provides over

50 potential metrics for analysis grouped in each of the 3 main areas (health, resources and relationships). Given the breadth of the framework, the study proposes a 'Foundation model' focusing on 10 metrics as a starting point to estimate some of the social costs associated with gambling-related harms.

From a private or individual perspective on the economic and social costs of gambling-related harm, one working paper by Pryce and others (9) estimates the total income loss for people participating in problem gambling. The paper suggests this could be as high as £31 billion annually in England. However, these results need a careful interpretation. The analysis has a potential risk of bias and the data source used (the British Gambling Prevalence Survey is from 2010 when online gambling was not so common) is a limitation as it may not represent the current patterns of participation in gambling activities in England.

## International evidence

In general, there is a lack of international evidence on the costs associated with gambling-related harms.

The most recent figures from Australia estimated the total cost of gambling-related harms in the state of Victoria to be 7 billion Australian dollars (AUD) in 2014 to 2015 (about £3.98 billion using [Forbes currency converter](#) on 4 November 2022) (11). This total cost was for an estimated population of 549,289 gamblers at all levels of risk (or 12.9% of the adult population in Victoria, which is 4.4 million). The population of gamblers was stratified using the Problem Gambling Severity Index (PGSI) and sourced from a previous analysis by Browne and others, 2016 (10). This prevalence is 3 times higher than the one estimated for England and used in our analysis, as shown in table 2 of the methods section.

The costs include:

- financial
- emotional and psychological
- productivity loss and work impacts
- criminal justice system
- relationships and family
- impacts on health services

In this analysis, the major components of the cost of harmful gambling are borne by those gambling and the people around them (financial costs, emotional and physiological impact and

relationships). The AUD 7 billion figure relates to all gambling groups and decreases to AUD 2.4 billion (about £1.37 billion) when considering only the most severe, but less prevalent, people experiencing problem gambling. Previous work in Australia estimated total costs between AUD 4.7 and AUD 8.4 billion (between £2.67 and £4.78 billion) per year in 2008 prices (12). In this year, the general population was 21.6 million (13).

In Europe, one study estimated the social costs of gambling in the Czech Republic at between €541 and €619 million (about £473 and £541 million) in 2012 (14). The size of the general population was 10.5 million in this year (15). Personal and family costs accounted for nearly two-thirds (63%) of total costs, whereas crime, productivity losses and suicide each accounted for around 12% to 13% of total costs.

Focusing only on the healthcare costs of gambling-related harms, a study in Germany estimated that 'pathological and problem gamblers' cost an extra €218 million (about £191 million) to the healthcare treatment system each year (over the period 2008 to 2011). It found 12.5% of the total costs were directly caused by online gambling (16). The general population was 80.2 million in 2011 (15).

In the US, a study estimated the average total annual expenditure on healthcare of a patient diagnosed with pathological gambling to be between \$9,523 and \$12,937 (about £8,495 and £10,848) in 2012 (17). It found pharmaceutical expenditures represented around 16% to 22%. Whereas European countries may share similarities in healthcare coverage and public financing of healthcare, healthcare in the US is organised very differently to the UK, so it is unlikely that these figures are more than illustrative.

The evidence review has shown that there is a clear gap in the assessment of the true scale of the total economic burden associated with gambling. The analysis presented here aims to add evidence on England to the existing body of knowledge.

## 2. Methods

The aim of this study is to estimate the annual economic burden associated with gambling-related harm in England. We use a range of data sources and extrapolate average cost estimates to the English population experiencing different levels of harmful gambling.

To cost gambling-related harms, we used evidence from [PHE's gambling-related harms review](#). Where there were gaps in this evidence, we supplemented this with evidence from a structured literature review (described in the Introduction), as well as a rapid literature search carried out for the 2023 update which is described in section 4.2. Economic evaluations and cost analyses gather information from different sources such as the effect size of an intervention, or the unit costs of delivering an intervention. It is common that these data inputs are published for different years and timeframes. This report presents annual cost estimates that have been updated using HM Treasury's Gross Domestic Product (GDP) deflator as required. All costs presented are in 2021 to 2022 prices.

### 2.1 Population of analysis

Analysis from the Health Survey for England 2018 shows that over half of the population in England take part in gambling. As per PHE's [gambling prevalence analysis report](#), this equates to 24.5 million people. Our analysis is focused only on people participating in harmful gambling. This includes people experiencing problem gambling and those gambling at elevated levels of risk (or 'at-risk'), which can be further divided into those at lower risk and moderate risk (19).

Our analysis in most cases uses estimates of each of these groups according to the Problem Gambling Severity Index (PGSI), which is an instrument developed for use among the general population. When calculating the estimated cost of excess suicides, we also use the DSM-IV criteria, from the Diagnostic and Statistical Manual of Mental Disorders, fourth edition, which is an alternative instrument for identifying harmful gambling (more detail below).

In total, we estimate around 1.76 million individuals in England have some level of risk attached to their participation in gambling, using the PGSI instrument, with 168,149 of these classified as experiencing problem gambling. Table 2 provides estimates of the prevalence in each of the groups. We combine both low-risk and moderate-risk in certain areas of this report and refer to this as at-risk gambling. We at times refer to those participating in harmful gambling, which combines people experiencing problem gambling and those gambling at levels of elevated risk.



**Table 2. Prevalence of harmful gambling in England by PGSI score**

Type of gambler by PGSI score	Central prevalence estimate	95% confidence interval: low estimate	95% confidence interval: high estimate
Low-risk (PGSI score 1 to 2)	1,213,830	990,317	1,437,342
Low-risk (PGSI score 1 to 2)	2.7%	2.4%	3.1%
Moderate-risk (PGSI score 3 to 7)	377,242	273,240	481,245
Moderate-risk (PGSI score 3 to 7)	0.8%	0.7%	1.1%
Problem gambler (PGSI score 8 or more)	168,149	102,185	234,113
Problem gambler (PGSI score 8 or more)	0.4%	0.3%	0.5%
Total	1,759,221	1,365,742	2,152,700
Total	3.9%	3.4%	4.7%

Source: OHID analysis of data from the 2018 Health Survey for England (3). Percentage relates to the proportion of the 16 years and over population.

The table presents the central prevalence estimate from HSE, as well as the top and the bottom of the 95% confidence interval, which we call the high and low estimate. The central prevalence rate is used as standard in the analysis presented in this report, and we use the low and high estimates for sensitivity analysis.

At a population level, gambling-related harms experienced by people participating in low-risk gambling can be greater at aggregate level than harms experienced by those problem gambling, given the size of these populations. However, despite interest in estimating gambling-related harms experienced by the at-risk populations, we did not find enough evidence to do so consistently throughout the analysis. So, some of the analysis will only estimate harms for people experiencing problem gambling.

Another population of interest are the affected others of gamblers and the harms they experience. PHE's gambling prevalence analysis report provides estimates based on YouGov data for England. Gambling-related harm for this population can also take different forms, such as financial harm and relationship deterioration. However, this population has not been explicitly analysed in this report due to a lack of data to use as inputs for developing estimates. We think this should be a future area of focus in research.

## Breakdown by age and sex

For some aspects of the analysis, it was useful to break down harmful gambling groups by age and sex. To ensure a more robust sample size for this level of detail, we used the combined dataset of several years of Health Survey for England data (2012, 2015, 2016 and 2018) to

generate the percentage of people experiencing harmful gambling in each age and sex category. We then applied these to the 2018 HSE totals to form the estimates used in the analysis (by multiplying the percentages below by 2018 total populations by age and sex and then scaling these proportionately to equal the 2018 HSE totals for each category people participating in harmful gambling). The age and sex breakdown used in the analysis is provided below. Interim figures are provided in Appendix D.

**Table 3. Central PGSI population estimates by age and sex in England**

**Male**

Age	Low-risk	Moderate-risk	Problem gamblers	Total
16-19	108,322	12,085	2,366	122,774
20-24	179,517	53,275	38,742	271,534
25-29	178,243	51,356	17,237	246,836
30-34	108,742	30,735	27,352	166,829
35-39	82,312	31,989	9,964	124,265
40-44	50,884	30,818	4,827	86,528
45-49	55,297	21,312	19,473	96,082
50-54	54,798	22,568	6,498	83,864
55-59	40,179	18,583	10,612	69,373
60-64	32,074	10,360	2,536	44,970
65-69	18,256	3,870	5,051	27,176
70-74	18,148	6,839	3,347	28,334
Total	926,772	293,790	148,004	1,368,566

**Female**

Age	Low-risk	Moderate-risk	Problem gamblers	Total
16-19	23,353	1,320	0	24,673
20-24	33,396	26,969	3,960	64,325
25-29	42,393	11,502	2,815	56,710
30-34	31,437	10,662	1,305	43,404
35-39	32,105	7,164	1,403	40,671
40-44	14,844	7,552	2,464	24,861
45-49	22,257	2,696	3,959	28,912
50-54	31,404	9,810	0	41,214
55-59	22,776	4,457	2,909	30,142
60-64	14,429	0	1,331	15,760
65-69	10,900	1,320	0	12,221
70-74	7,763	0	0	7,763
Total	287,058	83,452	20,145	390,655

## Male and female

Low-risk	Moderate-risk	Problem gamblers	Total
1,213,830	377,242	168,149	1,759,221

We took the same approach for the upper and lower bounds of the 95% confidence interval for these population estimates (see Appendix D for resulting figures).

## Using the DSM-IV criteria

An alternative approach to assessing harmful gambling status is using the DSM-IV criteria, from the Diagnostic and Statistical Manual of Mental Disorders, fourth edition. Both measures are captured in the Health Survey for England. The DSM-IV instrument is a tool created for diagnosis by clinicians of pathological gambling, so is more suitable for a clinical setting. However, an adapted version for use in a survey setting was developed for the British Gambling Prevalence Survey series.

Broadly speaking, a score of 3 or more on DSM-IV is equivalent to 8 or more on PGSI, representing problem gambling. However, a score of 5 or more on DSM-IV can be used in clinical settings to assess gambling disorder, previously referred to as pathological gambling. (There is a more recent fifth edition of the DSM, DSM-5, which is more likely to be used in clinical settings currently.)

Gambling disorder and pathological gambling are terms used when describing people experiencing the most severe spectrum of harmful gambling, although they are captured within the problem gambling cohort. We have used this smaller population with higher levels of harmful gambling for part of the analysis on suicide, as described later in this report.

Using the DSM-IV instrument, 121,184 individuals meet the score of 5 or more, indicating pathological gambling or gambling disorder (with the caveat that this does not come from clinician-based assessment).

**Table 4. Number of people scoring 5 or higher using DMS-IV criteria in England**

Central prevalence	95% confidence interval: low estimate	95% confidence interval: high estimate
121,184	77,054	215,192

Source: OHID analysis of data from the 2018 Health Survey for England (3)

## 2.2 Perspective of analysis and types of costs

The goal of this analysis is to estimate the financial costs to government and the societal value of the health impacts of gambling-related harm experienced by the English population classified as participating in harmful gambling. It is not within the scope of PHE's gambling-related harms evidence review to undertake an estimate of the benefits associated with gambling activity.

Gambling-related harm is considered both a public health and wider societal problem and the literature identifies a list of potential harms derived from risky gambling activity.

We identified the potential cost categories included in the analysis through [PHE's gambling-related harms review](#), which builds on [a conceptual framework for understanding gambling related harm published by BMC Public Health](#), and is complemented by the economic structured literature review (summarised in the Introduction).

The conceptual framework separates harms into types and temporality. The types of harms are:

- financial
- relationship disruption, conflict or breakdown
- emotional or psychological distress
- cultural
- reduced performance at work or study
- criminal activity
- detriments to health

Temporality refers to the notion that a harm can occur at the first single engagement with gambling and continue even after a person has stopped. These are:

- general
- crisis
- legacy

Langham and others' article on understanding gambling-related harm includes an [infographic outlining the conceptual framework](#).

The intended approach was to include data relating to all these dimensions, but we excluded cultural harm because of a lack of data.

These gambling-related harms affect the individual (which can potentially be monetised as private costs) and third parties including affected others and the wider society (external costs).

Typically, cost-of-illness analyses only include external costs caused by the illness or health condition itself (21). The standard government approach to economic evaluation and impact assessment focuses on external costs because these justify government intervention and regulation. Private costs borne by individuals are excluded from these analyses, given the underlying assumption that these private costs are offset by private benefits. While this assumption may hold true in many situations, it is less likely when rational choice is compromised by addictive behaviour. It may also be that these private costs worsen inequalities, with gambling profits representing resources moving from more disadvantaged to less disadvantaged individuals.

In the case of harmful gambling, private costs such as financial harms (debt, loss of available income) are an important proportion of the total harm experienced by the individual (1, 11).

On external costs associated with gambling-related harm (those costs that affect others than the gambler), previous work has been done in Australia (Browne and others (11)) and other countries (as described in the Introduction). Appendix B reports an extensive list of harms considered in the analysis of social costs in Victoria, Australia (11).

The approach here adopts a framework developed for the UK by Wardle and others (8). This framework takes into consideration the specifics of our setting and data availability. Whereas the framework provides over 50 metrics of gambling-related harm, Wardle and others (8) also propose a simplified model to start with, the 'Foundation model'. This is formed of the areas where evidence of harm exists and are likely to have data, so gambling-related harms can be costed. The areas of the Foundation model are:

1. Loss of employment.
2. Experience of bankruptcy or debt.
3. Loss of housing or homelessness.
4. Crime associated with gambling.
5. Relationship breakdown or problems.
6. Health-related problems.
7. Suicide and suicidality.

Table 5 adapts this Foundation model, mapping the suggested metrics above with the Langham and others conceptual work . It also shows whether our analysis has costed each metric and the entity that bears that cost, which can be either government or wider society. We have added the metric ‘opportunity cost’ within financial harms as this is an important harm that is not included in the original Foundation model. Given the cross-cutting nature of health, we have combined 2 pillars from Langham and others, ‘emotional and psychological distress’ and ‘decrements to health’, into a ‘health’ category. As mentioned earlier, these costs can be borne by the individual as well as costs falling to the government and wider society. Due to data limitations, the cost estimates presented are mainly those borne by the government.

**Table 5. Potential harms and actual costs estimate in our analysis**

<b>Domain (Wardle and others 2018)</b>	<b>Harms (Langham 2014)</b>	<b>Metric (proposed in the Foundation model by Wardle and others 2008)</b>	<b>Cost estimate produced in our analysis</b>	<b>Government costs (a)</b>	<b>Wider societal costs (b)</b>
Resources	Employment	Number of job losses; increased claims on benefit system	Yes	Yes	No
Resources	Financial	Opportunity cost of gambling (not included in the original Foundation model)	No cost attached given the lack of robust data, but we do discuss the evidence	No	No
Resources	Financial	Bankruptcy, debt relief orders	No cost attached given the lack of robust data, but we do discuss the evidence	No	No
Resources	Financial	Increased use of debt services	No cost attached given the lack of robust data, but we do discuss the evidence	No	No
Resources	Financial	Homeless applications	Yes	Yes	No
Resources	Crime	Crimes committed	Partially, only crimes with a conviction	Yes	No

The economic cost of gambling-related harm in England: evidence update 2023

Domain (Wardle and others 2018)	Harms (Langham 2014)	Metric (proposed in the Foundation model by Wardle and others 2008)	Cost estimate produced in our analysis	Government costs (a)	Wider societal costs (b)
Relationships	Relationships	Divorce, separation, relationship breakdown	No, due to lack of robust UK and England data available	No	No
Relationships	Relationships	Increased use of relationship services	No, due to lack of robust UK and England data available	No	No
Health	Health and emotional stress	Experience of stress, depression, anxiety, non-suicidal self-harm, other mental and physical health conditions, substance (alcohol and drug) misuse	Partially, association of gambling with depression, alcohol and drug misuse	Yes	Yes, quality of life impacts resulting from excess depression cases associated with gambling
Health	Health and emotional stress	Number of deaths by suicide, suicide attempts	Partially, only deaths by suicides (we do not cost suicide attempts)	No	Yes

Notes: (a) Government costs: costs borne by government that involve the loss of resources that could otherwise be used for consumption or investment. (b) Wider societal costs: costs borne by external parties beyond government. This potentially includes costs to the economy (for example, productivity costs), to private companies, to victims of gambling-related crime or the societal value of a life lost or QoL loss.



As shown in table 5 above, the analysis has been able to produce cost estimates for the following categories of harm:

- financial harms (statutory homeless applications only)
- health
- work and employment
- criminal activity

We estimate most costs from the government perspective where there is evidence of a fiscal or taxpayer cost in the literature. These tangible costs borne by government involve the loss of resources that could otherwise be used for consumption or investment. We can classify these costs as:

- direct costs, such as healthcare resources directly used to address gambling-related harm
- indirect costs, which relate to resources being unavailable for other productive use, such as criminal justice system costs and unemployment benefits

In 2 cases it has been possible to produce an estimate of intangible costs. These costs represent health loss rather than resource loss (23). One of these harms was the loss of life through deaths by suicide associated with gambling-related harms. Here, we attach a cost estimate to the loss of life from deaths by suicides through the estimated social value of life lost (using a quality-adjusted life year, or QALY-based approach). We also estimate the health impacts of excess depression cases associated with gambling. To do this, we estimate the impact this has on an individual's quality of life, and monetise this using the cost of QALY, quantified in [HM Treasury's Green Book](#). Further details are available in section 4. In these cases, we estimate this cost from a wider societal perspective instead of a government one.

There are harms for which it was not possible to produce cost estimates due to a lack of robust evidence. This is the case for relationships, where the [PHE abbreviated systematic review of harms associated with gambling](#) did not identify quantitative estimates of relationship break-ups or using relationship services associated with gambling. We discuss financial harms to the individual in the context of relevant new evidence for the UK (4), but we do not cost these due to a lack of appropriate data.

Finally, it has not been possible to produce cost estimates in all sub-domains (see table 6) for the entire population of interest of people engaging in harmful gambling, particularly those participating in low-risk or moderate-risk gambling, rather than problem gambling. Some evidence is only available for the latter group, such as criminal activity, unemployment benefits

estimates or suicides. Table 6 shows each of the cost components and the population to which they apply.

**Table 6. Estimation of costs produced by gambling-related harms by analysed population**

Type of harm	Sub-domain	At-risk gambling (low and moderate risk)	Problem gambling
Financial	Statutory homelessness	Yes	Yes
Health	Deaths from suicides	No	Yes
Health	Depression	Moderate-risk are included, low-risk are not	Yes
Health	Alcohol dependence	Yes	Yes
Health	Illicit drug use	Yes	Yes
Employment and education	Unemployment benefits	No	Yes
Criminal activity	Imprisonment	No	Yes

Source: OHID analysis.

## Data inputs

For the health analysis, we only extracted parameter estimates of harms through the harms review, including odds ratios, probabilities and resource use (except for the additional literature searches conducted on depression for the 2023 update). Odds ratios were converted to relative risks following expert advice from DHSC epidemiology.

We took this approach because we did not find longitudinal evidence on the other domains of harm from the [PHE gambling-related harms evidence review](#). We sourced data on crime, statutory homelessness and employment use inputs from other studies found outside the harms review. Appendix C provides a summary table of all the data inputs used in the analysis.

Unit cost data used in the analysis comes from a range of sources, including:

- PHE’s own estimates of cost of illness
- NHS reference costs
- Personal Social Services Research Unit cost estimates for health and social care (24)

- Home Office's economic and social costs of crime database (25)
- Greater Manchester Combined Authority Research Team database (previously named New Economy) for unemployment, statutory homelessness and more (26)

We provide details on each of the data inputs and their sources in each of the costing chapters.

## 2.3 Approach to estimating costs

The analysis mainly estimates direct costs that represent the diversion of resources towards the management of the impacts of harmful gambling in the different domains. For example, criminal activity is an estimate of the direct cost of imprisonment, which includes the costs to the criminal justice system. This is quantified by calculating the excess costs between a defined harmful gambling group compared to the non-gambler population.

The estimates represent costs associated with gambling, but it is not possible to say that these costs were caused by gambling. This is due to the limited evidence on harms in the population that are attributable to gambling, often referred to as attributable fractions for the population. This is further explored in section 2.6.

We also make estimates of the intangible costs of suicide and depression cases associated with harmful gambling. In this case, intangible costs are those associated with loss of quality and length of life, expressed as QALYs. In our analysis, we use QALYs to estimate the impact suicide has to length of life, and depression has to quality of life.

The following example shows the approach applied to estimating the excess cost of an individual with depression associated with harmful gambling:

$$\text{Cost of harm} = (N_G - N_P) * C_1$$

Where:

$N_G$ =estimated number of people engaged in at-risk and/or problem gambling with depression

$N_P$ =estimated cases of depression in this population if rates were the same as the population that does not engage in harmful gambling

$C_1$ =unit cost of an individual with depression

In this example, we estimate the cost of depression associated with harmful gambling. We do this by first estimating the rate of depression in the general population if cases of depression associated with harmful gambling were excluded. We then calculate the number of those engaging in at-risk and/or problem gambling who would have depression using this rate

(without any cases associated with harmful gambling) and subtract this from the actual expected prevalence estimate for this group. We refer to this as excess cases. We then assign a unit cost to this difference to estimate the total excess cost of depression associated with harmful gambling.

## 2.4 Timelines of analysis

Given the variety of data sources required to produce the analysis, there are minor differences in the time horizons of each element of the analysis. Broadly speaking, the analysis captures events happening over a given year, but includes long-term consequences when appropriate.

Some specific examples are as follows.

1. The analysis for deaths by suicide looks at the number of excess deaths by suicide in a given year, but then calculates the impact in terms of total years of life lost for each death by suicide.
2. The analysis for alcohol and drugs captures the total excess prevalence associated with harmful gambling, but calculates costs based on treatment for the proportion of alcohol dependent people and users of illegal opiates and/or crack cocaine in treatment in one year.
3. The analysis for depression looks at the excess cases of depression within a given year and calculates the impact through the cost of quality of life losses for a depressive episode (mean duration less than one year) as well as the cost of treatment in a year.
4. The analysis for homelessness considers the excess number of homeless applications in a given year and applies the annual costs for one-off homeless applications as well as ongoing costs.
5. The analysis for crime estimates the excess prison population in a given year and the associated annual costs of imprisonment.
6. The analysis for unemployment estimates the excess cases of individuals taking up unemployment benefits within a year. This is then used to calculate government costs for a given year based on the average duration of unemployment.

## 2.5 Approach to uncertainty

There is some uncertainty around the most appropriate assumptions to use to estimate the number of deaths by suicide associated with harmful gambling. So, for the 2023 update of this report, we followed the advice of the expert panel and presented a range of values. The size of

the range reflects the limits of the evidence available as well as the sensitivity of the costs to the number of deaths by suicide. We see the change from a point estimate as a necessary improvement to the methodology. The expert panel recommended that a range would better represent the uncertainty around the costs of suicide.

## 2.6 Association v causation

As noted elsewhere in this report, the estimates in this analysis represent the costs associated with gambling. It is not possible to say to what extent these costs were caused by gambling. An established association between, for example, harmful gambling and alcohol dependence, could mean any one or combination of 5 things:

1. Causality: harmful gambling causes or exacerbates alcohol dependence.
2. Reverse causality: alcohol dependence causes or exacerbates harmful gambling.
3. Confounders: something else causes or exacerbates both alcohol dependence and harmful gambling, such as a tendency to engage in compulsive behaviours.
4. Colliders: both harmful gambling and alcohol dependence can cause the same effects, such as depression, and a study that inappropriately controls for this in some way (for example, disproportionately includes people with depression in the sample) reports a distorted relationship. For more information on confounders and colliders see the Lee, Aronson and Nunan blog [‘Association or causation? How do we ever know?’](#).
5. No relationship: there is no causal relationship and the apparent association is coincidental.

The extent to which we can separate these out depends on the number, quality and design of studies. The greater the statistical significance, sample size and number of studies demonstrating an association, the more unlikely ‘no relationship’ becomes. Longitudinal studies that observe harmful gambling before the emergence of an associated harm can help control for the effects of reverse causality. Studies that explicitly control for known confounders (and leave known colliders uncontrolled) reduce the likelihood of confounders and colliders affecting the association they find.

What this means for our study is that the excess cases and corresponding costs we have calculated represent the excess cases associated with gambling. So, we are comparing what we observe in real life to a situation where none of the cases associated with harmful gambling occurred. We cannot say that these excess cases and costs are caused by harmful gambling, but instead that this is the best current evidence on the size of the association between harmful gambling and the harms detailed in this report. Some evidence is stronger, and some is weaker. The evidence presented below is based on longitudinal studies and meta-analyses

(pooled data from several studies) where possible and different studies have controlled for confounders to differing extents.

However, this should be considered alongside the fact that this analysis represents only some of the total costs of harm associated with harmful gambling. This is because we made conservative assumptions in calculating those costs, and also because there are lots of known harms associated with gambling we were not able to quantify, such as the costs to the individual, impacts on their family and friends, as well as quality of life impacts beyond depression. These and other unquantified costs are significant and point towards further areas of research that need to be explored to better capture the true costs of harms associated with gambling.

## 3. Financial harms

In this chapter, we consider the cost of financial harms of gambling from 2 perspectives:

1. An overview of the evidence on the cost to the individual (we were not able to include this in our analysis).
2. The direct costs to government to provide support to people who are homeless (included in our analysis).

We discuss each perspective in turn. In this analysis we have focused on the latter, the direct costs to government to provide support to people who are homeless. This is in line with the overall perspective of our analysis (see section 2.2 for further details).

### 3.1 Cost to the individual

This section was outside the scope of this update, but we have updated figures from the 2021 report where more recent data are available.

The gross gambling yield (GGY) is the regulated net revenue (after payment of winnings) earned by gambling operators in Great Britain. We can interpret this as the amount of money gamblers have lost during a given year. For 2021 to 2022, the GGY was estimated to be £14.1 billion (27). As discussed in the methods section, this can be considered a private transfer from individuals to the gambling industry. This transfer of money may or may not follow (in the case of a gambling addiction or disorder) a rational choice from people that gamble, of which there are estimated to be around 24 million in England (3).

For our sub-population of analysis of people engaging in harmful gambling (around 1.8 million in England), this expenditure may not follow a rational decision-making process given the addictive behaviour. Financial harms can take many different forms. In some extreme cases this can be a catastrophic event where an individual person loses all their wealth and livelihood. Indeed, financial harm associated with or caused by problem gambling may be one of the most obvious and prevalent harms.

People who gamble may experience an erosion of savings and financial resources together with a loss of extra money to spend on both luxury items and non-luxury items. In some instances, people who gamble may even lose the ability to meet basic needs, such as buying food, essential medications, clothing, housing, children's educational requirements and transport costs. To continue funding their gambling activity, people may get into debt or finance it another way (like having a second job or selling property). Also, people may lose the ability to meet expenditure with long-term consequences like opting out of a pension scheme (20).

Recent quantitative evidence concludes that gambling activity is associated with financial distress, lower financial inclusion, and poor or lack of financial planning. These results are derived from a random sample of 102,195 Lloyds Bank customers and their monthly transactions during 2018. The data consistently shows that higher gambling expenditure is associated with worse financial outcomes (4). For illustration, the analysis shows that a 10% increase in absolute gambling spend is associated with:

- an increase in payday loan uptake by 51.5%
- an increase in credit card use by 11.2%
- the likelihood of missing a mortgage payment by 97.5%

Also, higher gambling activity is associated with smaller spending on insurance and mortgage repayments, smaller total savings, and smaller pension contributions.

The analysis on Lloyds Bank transaction data included gambling transactions, such as offline and online bookmakers, casinos, lotteries, and other providers of gambling services (4). Cash transactions made in betting shops and transactions at other types of retailers (for example, a lottery ticket at the supermarket) are not captured. Among the customers that made at least one gambling transaction during the year (43% of the sample), the median number of transactions was 12 (the mean was 56), with a median year spend of £125 (the mean was £1,345). This is about a median of 0.5% of monthly spending (a mean of 4%). The difference between the median and the mean shows that the distribution is highly skewed to the right: the top 10% of gamblers spend over £1,800 on gambling in the calendar year, close to 8% of their total spending. The regression analysis controls for age, gender and annual income. It does not include either comorbidity data or PGSI scores, an important limitation in this costing exercise (4). Even so, the study was a significant first attempt to understand the relationship between gambling and individual outcomes on a larger scale using UK data.

[GambleAware national gambling treatment service annual statistics for 2020 to 2021](#) show that out of a sample of 7,726 English residents who were treated within gambling services that report to the Data Reporting Framework:

- 63% had debts due to gambling (with the remaining 37% not reporting any gambling debt at that time)
- 23% had debts up to £5,000 related to gambling
- 40% had debts over £5,000, were bankrupt or in an Individual Voluntary Arrangement (a special arrangement to pay back debts)



The Data Reporting Framework is a data collection tool for people accessing Responsible Gambling Trust-funded treatment services for problem gambling and gambling-related harm in Great Britain. It is intended to support client care, and to provide sufficient data for secondary analysis and reporting for service quality development.

The data is not presented by PGSI scores but according to the report most of these individuals (who at the time of the analysis were treated within gambling services) were screened as 'problem gamblers' (having a PGSI score of 8 and over). The data also shows that gamblers reported spending a median of £1,000 and a mean of £2,100 on gambling in the previous 30 days before assessment. This is a considerable amount of resource dedicated to gambling and these average spend figures are very different to the ones reported in Muggleton and others (4), as mentioned above (median year spend of £125 and mean of £1,345). However, caution is needed when comparing such figures as the populations are not the same across these different analyses.

The [PHE abbreviated systematic review of harms associated with gambling](#) identified many qualitative and cross-sectional studies on the financial harms associated with gambling, but only one time-based quantitative study providing causal evidence on financial harms (29). The study examines whether changes in the number of electronic gaming machine (EGM) venues in a local area are associated with changes in the rates of serious financial problems. However, we considered that the outcomes of the analysis are not particularly relevant here as the study does not report the absolute effect, only the marginal effect of one extra venue in a local area of Australia.

The additional structured literature review we undertook for this report did not identify UK or England estimates of the likelihood of a gambler (identified by their PGSI score) experiencing financial harms compared to a non-gambler, or financial harms experienced by people participating in harmful gambling. Some studies, for example Wardle and others (8), have considered costing bankruptcies and increased use of debt services. However, it has not been possible to identify published data to estimate the rates of bankruptcies and use of debt services for people who participate in harmful gambling compared with the general adult population in England.

The limited evidence available means that it is not currently possible to conduct a costing analysis for financial harms to the individual.

For future work in this area, it would be helpful to produce causal evidence of the impact of gambling activity on financial outcomes, using a representative sample of people in England who participate in harmful gambling. This would allow for a costing analysis to be carried out.

## 3.2 Homelessness cost to government

### Introduction

We reviewed the analysis in section 3.2 and made minor improvements to the methodology, as well as updating the price year to 2021 to 2022 as part of the 2023 update. We did not conduct a full review of the methodology for this area, and we did not re-review the evidence used to inform assumptions and parameters as this was not in scope of the update.

The abbreviated systematic review of harms associated with gambling found several international qualitative and cross-sectional studies showing an association between harmful gambling and homelessness. But there is a lack of longitudinal research exploring the causal relationship.

One study in the area, by Sharman and others (30) used a cross-sectional design to measure levels of gambling involvement in people accessing housing services in Westminster, London. The study assessed gambling diagnosis using the PGSI and included shelters, hostels and day centres. It found that of the homeless population, 8.3% were low-risk gamblers, 3.3% were moderate gamblers, 11.6% were problem gamblers and 76.8% registered no risk of harmful gambling. For comparison, in the general population in England, 2.7% are low-risk gamblers, 0.8% are moderate-risk gamblers, and 0.4% are problem gamblers (3). This indicates a higher rate of problem gambling in a service-accessing homeless population compared to the general adult population. The gambling population within this sample comprised more men (41%) than women (22%) at all risk levels, where gender could be identified. This evidence represents the largest cohort of gamblers in homeless services analysed to date, using a sample of 456 people.

Sharman and others (31) have continued to advance this work by researching the longitudinal relationship between gambling and homelessness. In a sample of 72 participants from homeless centres in Westminster, London, they explored the proportion of gamblers who experienced a problem with gambling before entering homelessness services. Findings showed 61.5% of at-risk gamblers and 82.4% of problem gamblers participated in gambling activities before becoming homeless.

### Methodology

In general, our analysis closely follows the approach taken by Thorley and others (1) in applying the research from Sharman to construct an estimate for the impacts of gambling in homelessness. But we use calculated attribution rates to consider the possible causal relationship between the proportion of gamblers in statutory homeless services who experienced at-risk or problem gambling before becoming homeless (30, 31) as well as only looking at the impacts for the male population.

## Data inputs

The analysis draws on several parameters:

1. The prevalence of people experiencing at-risk and problem gambling. See Appendix D for the count of at-risk and problem gamblers.
2. The percentage of males in homeless services who report gambling, using the calculated positive association between gambling and access of homeless services from Sharman and others. These figures are:
  - percentage experiencing gambling problems before becoming homeless – low and moderate risk gamblers – 61.5%
  - percentage experiencing gambling problems before becoming homeless – problem gamblers – 82.4%
  - percentage of male low-risk gamblers in the homelessness service use sample, defined by PGSI – 14.2%
  - percentage of male moderate-risk gamblers in the homelessness service use sample, defined by PGSI – 5.6%
  - percentage of male problem gamblers in the homelessness service use sample, defined by PGSI – 20.8%
3. The number of successful statutory homeless applications under the prevention duty recorded by the Department for Levelling Up, Housing and Communities (DLUHC) equivalent to 148,670 in 2019 (32).
4. The mid-year estimate for the number of households in England from the Office for National Statistics (ONS), reported at 23,385,139 in 2019 (33).
5. The gambling prevalence rates for males in England in 2018, taken from the Health Survey for England. The prevalence of males:
  - participating in low-risk gambling is 4.28%
  - participating in moderate-risk gambling is 1.46%
  - experiencing problem gambling is 0.62%
6. The annual cost per statutory homeless application from the Greater Manchester Combined Authority (GMCA) unit cost database (26), whose unit costs are based on a

report by Shelter (34). Annual costs refer to one-off homeless applications and ongoing costs, which include:

- the cost of a court desk scheme (the amount paid by legal services commission per case handled by a court desk service)
- an application decision
- 4 weeks in temporary accommodation
- administration costs of a new letting

We realise that homeless support services have changed considerably over the decade and average time in temporary accommodation within a year may be longer than 4 weeks.

The reported annual cost per case has been updated using the [HMT GDP deflator](#) and equates to £3,091 in 2021 to 2022 prices.

## Calculations

The first step is to calculate the percentage of male gamblers accessing homelessness services who had a previous gambling problem. To do this, we take the percentage of males accessing homeless services who are gamblers from Sharman and others (30) and multiply this by the percentage experiencing gambling harm before accessing homelessness services taken from Sharman and others (31). We are assuming that the proportion of individuals engaging in harmful gambling before accessing the homelessness services is identical for males and females and can be applied to males only. You can find the figures for people engaging in low-risk, moderate-risk and problem gambling in Appendix D.

Using these figures and the percentage of male low-risk, moderate-risk and problem gamblers in the non-homeless population, we can calculate the relative risk for each group of accessing homelessness services, compared to those not engaging in harmful gambling behaviours. This is based on data of people participating in harmful gambling who accessed homelessness services in Westminster. We then assume that the relative risks derived for Westminster can be applied to England. This results in relative risks of males accessing homelessness services of 2.13 for people engaging in low-risk gambling, 2.38 for moderate-risk gambling and 27.35 for problem gambling (see Appendix D for further details on how we calculated these relative risks).

This analysis compares the expected number of homeless applications among the male gambling population using the male homeless application rate (without gambling-associated homelessness) against the (modelled) actual homeless applications in the male gambling population.

A homeless application is when a person applies to their local council for help with finding somewhere to live, if they are homeless or likely to become homeless within 8 weeks.

To calculate the number of statutory homeless applications per house across the year, the number of applications mentioning males derived from the annual report on statutory homeless applications published by DLUHC (32) is divided by the ONS mid-year estimate of the number of households in England (33). This is equivalent to 0.003 applications per household per year in 2019 to 2020, which references a male. We assume that the average of 0.003 of male related applications per household per year is the expected number of applications for male gamblers had harmful gambling behaviours not been a factor in homelessness. Multiplying 0.003 by the calculated relative risks produced a modelled estimate of the number of applications per male gambler household by type of gambler (male low-risk 0.006, male moderate-risk 0.007, male problem gambler 0.082). Subtracting 0.003 from each of the modelled number of male associated application per gambler household by type of gambler provides the excess rate of application by gambler type.

The resulting excess number of statutory male homeless applications per household is then multiplied by the central male gambling population count (as well as the lower and upper bound population estimates). This estimates the excess number of male associated statutory homeless applications in 2019 to 2020 associated with low-risk, moderate-risk, and problem gambling (15,856). We use these estimates in the calculations that lead to the results in table 7 below.

The total cost associated with male excess cases is calculated by multiplying the annual cost per application by the number of male excess statutory homeless applications.

## Results

Table 7 below presents the results of the excess direct costs of male homelessness associated with harmful gambling. The estimate of 15,856 excess statutory homeless applications associated with male at-risk and problem gambling in England equates to £49.0 million in 2021 to 2022 prices. This is a financial cost to government.

**Table 7. Excess cost of homeless services associated with at-risk and problem gambling in England**

Description of estimate	Estimate	Lower and upper bound estimates
Number of expected statutory homeless applications in the at-risk and problem gambling population, if there were no homeless applications associated with harmful gambling	4,114	3,319-4,766
All at-risk and problem gamblers expected to have applications	19,970	14,254-24,320
Excess homeless applications associated with harmful gambling	15,856	10,935-19,555
Excess direct costs (£ millions)	49.0	33.8-60.4

Notes: Figures may not sum due to independent rounding. Lower and upper bound estimates are based on the lower and upper bounds of the 95% confidence interval for the number of people engaging in harmful gambling.

## Limitations

The analysis has several limitations. First, the analysis is limited to costing the associations between gambling and statutory homeless applications only. It does not analyse or cost the association between people who sleep rough who are engaging in harmful gambling. We recommend further consultation with experts working in the homelessness and rough sleeping field to improve data collection and to develop a more robust methodology to analyse a larger sample of the homeless population. This is because evidence in the abbreviated systematic review of harms associated with gambling suggests the homeless population are more vulnerable to gambling related harms.

Second, we assumed that the proportion of gamblers accessing 3 housing services in London can be scaled-up to the rest of England. Experts acknowledge that this is a crude assumption since the London sample will not be representative of the English population accessing services, not least because of the variation in homeless support services across the country.

Third, the sample of people analysed only focuses on the men accessing homeless services. As a result, the cost underestimates the true cost of gambling and homelessness. This was because we considered the sample size of females included in Sharman and others (30, 31) to be too small (only 18 females) to use in our analysis. This number is reduced yet further when we look at how many females accessed homeless services before and after gambling.

## 4. Health harms

Harmful gambling behaviours have the potential to affect an individual's physical and mental health, happiness and wellbeing, impacting the individual themselves, as well as their families, the economy and wider society. There are some international studies indicating that gambling problems are associated with poorer health (11, 35).

Cowlishaw and Kessler (35) conclude that there is a disproportionate burden of gamblers using healthcare services but they were unable to infer causality. They found that problem gambling has likely implications for mental health but given the complexity of the relationship they could not “infer mechanisms that underlie cross-sectional associations”.

To address this issue, further research has analysed results taken from longitudinal studies and meta-analyses of cross-sectional studies on gamblers and health, which strengthen the associations of these relationships (36 to 38, 84 to 86). The studies identified associations with suicide attempts and deaths by suicide, depression, drug and alcohol use for gamblers compared to non-gamblers in the UK and countries that could be generalised to the English population. We sourced evidence from OECD countries that we deemed to be of high quality with a low-to-moderate risk of bias.

Many of the studies identified reported odds ratios, where an odds ratio (OR) greater than 1.0 indicates an increase in odds of an event among gamblers compared to non-gamblers and non-problem gamblers. For this analysis, these ORs have been converted to relative risks (RR), which represent the ratio of risk among gamblers compared to non-gamblers and non-problem gamblers. The methodology for this conversion is discussed later in this section, and was confirmed to be suitable by a DHSC epidemiologist. Again, a RR greater than 1.0 indicates a higher risk of the event in the comparison group, compared to the control group. We used the ORs, converted to RRs, from the identified studies as a measure of strength of association between the exposure and the outcome (39). These RRs are applied to English gambling prevalence data, to estimate the excess cases associated with gambling, given the increased risk of these events. For deaths by suicide, we used standardised mortality ratios (SMR), as this is the main data metric available.

The estimated health and healthcare costs associated with gambling include:

- deaths by suicide
- treatment of depression
- health impacts of depression (added in the 2023 update)
- treatment of alcohol dependence

- treatment of illicit drug use

We discuss each of these elements in turn.

## 4.1 Suicides

### Introduction

As part of this update, we conducted a full review of the analysis in this section. We made improvements to the methodology, as well as updating the price year to 2021 to 2022. We consulted the expert panel who helped decide what changes we should make to the methodology.

The [ONS data on suicides in England and Wales](#) show that in 2019, the rate of deaths by suicide in England was 10.8 deaths per 100,000 population (5,316 deaths). Men accounted for around three-quarters of suicide deaths registered, with similar trends in 2020 and 2021.

There is a growing evidence base analysing the relationship between gambling and suicidality but studies in this area for England are scarce. As there is no official data or registries reporting the number of deaths by suicide associated with or caused by harmful gambling in England, we explored alternative proxies. These were identified through a literature review that included papers from the [PHE abbreviated systematic review of harms associated with gambling](#). For this update, the expert panel then scrutinised the suitability of a number of papers, as well as a menu of methodological options. Two papers were most of interest to the expert panel: Karlsson and Hakansson (36) and Wardle and others (40).

Karlsson and Hakansson (36) explored the relationship between the rate of deaths by suicide among people with gambling disorder (GD) compared to the general population in Sweden. This longitudinal study followed a large sample of 2,099 Swedish patients diagnosed with GD between 2006 and 2016 according to the 10th revision of the International Classification of Diseases (ICD-10). As this is a longitudinal study that tracks individuals over time, it allows the authors to better understand the relationship between problem gambling and suicide, compared to a cross-sectional study focusing on a population at one point in time. The authors note that ICD-10 uses the term 'pathological gambling', but they use gambling disorder, "as this is the nomenclature chosen in the upcoming ICD-11 and also is the term in use in the fifth edition of Diagnostic and Statistical Manual of Mental Disorders".

Karlsson and Hakansson found that individuals with GD were 19.3 times and 9.6 times more likely to die by suicide compared to the general population in younger (20 to 49 years) and older (50 to 74 years) age groups, respectively. When looking at only men, the increased risk factors associated with gambling disorder were also consistent for both younger and older age



groups. However, no statistically significant result was found for women only, likely due to the relatively small number of females in the sample.

Sweden is an OECD country and has a similarly structured economy to England with comparable social structures. To use metrics from this paper and apply them to an English estimate, we need to make some assumptions. So, we assume that the Swedish population, including those with GD, are directly comparable to those in England. In 2018, the prevalence of problem gambling in Sweden was 0.6% (43), similar to the prevalence in England (0.4%). As the individuals in the sample from Karlsson and Hakansson (36) had received a diagnosis in the Swedish inpatient or outpatient specialist healthcare system, we made a further assumption. The assumption was that the GD sample with a clinical diagnosis is equivalent to the wider problem gambling population (for calculating the upper bound estimate in the range presented below), or those meeting the criteria for GD in a population survey (lower bound estimate) of the gambling-associated suicide rate. Given the limited number of studies on the suicide rate for people receiving treatment compared to the general population, the expert panel agreed this was the best evidence to apply in this context.

Wardle and others (40) examined the English 2007 Adult Psychiatric Morbidity Survey to explore the association between harmful gambling and suicide ideation in England. Based on a small sample of 41 people identified as experiencing problem gambling, their results estimated that 1 in 20 engaged in problem gambling had experienced a suicide attempt in the past year. They also found a significant correlation between problem gambling and lifetime suicide attempts, reporting an increased odds ratio of 3.3 when compared to non-gamblers. The results from this study are the first to analyse the lifetime association between suicide attempts comparing people with and without problem gambling behaviours.

As Wardle and others (40) use an English sample, their results could be directly applicable to the UK. However, the robustness of their results is questionable due to the small sample size as only 41 people experiencing problem gambling were identified from the sample of 7,403 adults. Also, the output metric from this paper is not directly applicable to our analysis as we are calculating deaths from suicide rather than suicide attempts. The authors report that 4.7% of those identified as experiencing problem gambling attempted suicide in the last year compared to 0.6% in the non-problem gambling sample. This translates to 2 people experiencing problem gambling attempting suicide in the past year out of 41 making this result highly sensitive to small rises in suicide attempts. The small sample and subsequent uncertainty is reflected in the wide 95% confidence intervals supplied with these figures.

When comparing these 2 studies, the results across both papers support the association between suicidal behaviours (deaths and attempts) and problem gambling or gambling disorder. Wardle and others (40) analyse a UK sample which could mean their results are more relevant to the UK than Karlsson and Hakansson (36). However, Karlsson and Hakansson (36) have a much larger sample meaning their results are more robust, but we needed to make additional assumptions to use their results. Wardle and others (40) provide 95% confidence

intervals of 1% to 19.6% for suicide attempts in the past year in the problem gambling population, meaning they are 95% confident the true value lies within this range. By assuming the rate at which suicide attempts become suicide deaths is the same in both the problem gambling and non-gambling or non-problem gambling populations, we can derive a standardised mortality ratio of 7.8 (95% CI 1.7 to 32.7) from Wardle and others. The equivalent SMRs from Karlsson and Hakansson (36), 19.3 and 9.6, fit comfortably within this range suggesting the figures from Karlsson and Hakansson (36) are not unreasonable.

It is also worth noting that when making comparisons by sex, the evidence from Karlsson and Hakansson (36) better fits the latest data available on gambling prevalence and suicide rates in England. This is because the gambling prevalence data for England shows that men are more likely to be experiencing problem gambling than women (about 148,000 men compared to 21,100 women (3)). And from ONS data on suicides, men have higher age-standardised suicide rates than women (men 14.3 compared to 4.1 women, rate per 100,000 people (42)).

After consulting members of the expert panel, we agreed that the effect size should be derived from Karlsson and Hakansson (36) rather than both Karlsson and Hakansson and Wardle and others (40) but should represent the uncertainty over this estimate. So, in using Karlsson and Hakansson's SMR, we take the upper and lower bounds of the 95% confidence interval and provide a range, rather than using the central point estimate.

Of the population to apply this effect size to, the expert panel again suggested using a range, given uncertainty in applying results from a clinically diagnosed population. They recommended using 2 population estimates:

1. The problem gambling population used throughout this analysis. These are people scoring 8 or more using the PGSI (equivalent to a score of 3 or more using the DSM-IV, which is also available in the Health Survey for England). This is just under 170,000 people.
2. A subset of the problem gambling population used throughout this analysis. These are people scoring 5 or more using the DSM-IV. This is just over 120,000 people.

The upper bound figure is standard practice for population surveys, but a score of 5 or more on the DSM-IV measure may better represent those qualifying for a clinical diagnosis of gambling disorder.

So, the upper bound of the range we calculated uses the upper bound of the Karlsson and Hakansson (36) SMR 95% CI paired with the problem gambling population (PGSI score of 8 or more) while the lower bound implements the lower bound of the SMR 95% CI from the same paper with the gambling disorder population (DSM-IV score of 5 or more). Providing a range allows us to reflect the uncertainty in our estimate.

You can find more information about our range calculations, including a discussion comparing this with other relevant papers, in the section on alternative papers and estimates below.

## Methodology

### Data inputs

The analysis makes use of several parameters from the literature and routinely collected datasets. These are:

1. Prevalence of people experiencing problem gambling or gambling disorder (92).
2. Standardised mortality ratios (SMRs) (Karlsson and Hakansson (36)): the SMR 95% CI for all persons across the 2 age categories 20 to 49 years and 50 to 74 years for all persons in Sweden (36).
3. Rate of suicide deaths per 100,000 people for 2019 disaggregated by gender and 5-year age bands for all persons in England (92) (for further details on suicide analysis see table 25 in Appendix D). For the purposes of this analysis, we removed deaths of undetermined intent from the rate per 100,000 people (equivalent to approximately 15% of suicides). Karlsson and Hakansson only included deaths that were certified to be suicides and excluded deaths from undetermined intent. To align with this, we have done the same. This differs from the definition used by ONS for calculating suicide rates for England, which includes both suicides and undetermined deaths.
4. National life expectancy tables published by ONS (44).
5. The average health-related quality of life figure for England, 0.868 (England's mean EQ-5D score) (45).
6. Unit cost of £70,000 per QALY from the [HMT Green Book](#).
7. The discount rate for health of 1.5%, declining to about 1.3% after 30 years from the [HMT Green Book](#).

### Calculations

The following section describes the calculations used in estimating the cost of suicide associated with problem gambling. This cost represents the societal value of the quality-adjusted life years lost as a result of excess suicides associated with problem gambling. As discussed in this chapter's introduction, we used SMRs from Karlsson and Hakansson (36) for the ratio between suicides in the problem gambling or gambling disorder population and the general population. To reflect uncertainty in the model, we used 2 gambling populations,

problem gambling (PGSI 8 or more) and gambling disorder populations (DSM-IV 5 or more), to provide a range.

For this overview, PG will be used as an interchangeable term for the PGSI 8 or more population (problem gamblers) and the DSM-IV 5 or more population (gambling disorder). The formula for the overall calculation is:

Total cost of suicide = excess suicides × utility adjusted value of life lost per suicide (discounted)

To calculate excess suicides, we must calculate the observed number of suicide deaths in the PG population and the expected number of suicide deaths for the same population if they had the same rates as the rest of the population.

We first calculate the age-specific suicide rates for people not engaging in PG in England for 2019. This is achieved by rearranging the following formula:

$$y = (1-g)x + gxSMR$$

to

$$x = y/((1-g)+gSMR)$$

Where  $y$  is the overall suicide rate (excluding undetermined deaths, as discussed above),  $g$  is the PG population as a proportion of all individuals,  $SMR$  is the age-specific Karlsson and Hakansson standardised mortality ratio for those with gambling disorder and so  $x$  is the suicide rate for the non-PG population.

Applying  $x$  to the PG population gives the expected number of suicides in the PG population with no problem gambling or gambling disorder-associated suicide, applying  $xSMR$  to the PG population gives the actual expected number of suicides in this population. Calculating the difference between these figures results in the excess number of deaths by suicide associated with problem gambling or gambling disorder, per age and sex band.

To calculate the value of life lost per suicide, or the intangible unit cost, we used ONS life tables to calculate the number of life years lost due to death by suicide (44). The median age is used as age of death for each age and sex band, for example 47 years is used for the 45 to 49 year old male age band. According to ONS life tables, the average period expectation of life at age 47 for men is 33.9 years, which we interpret as the number of life years lost.

To value the years of life lost, we convert them to quality-adjusted life years (QALYs). A QALY is a summary metric that takes account of the number of years lived adjusted by the quality of life experienced in particular health states. One QALY is equal to one year in perfect life. The

societal value of a QALY presented in the [HMT Green Book](#) is £70,000. The intangible cost represents the willingness-to-pay to avoid the loss of one QALY.

To adjust the years of life lost by health-related quality of life, we used published health state utility values, specifically England’s mean EQ-5D score of 0.868 (45). This means each year of life lost due to suicide was valued at £70,000 x 0.868, or £60,760, before discounting future impacts.

The intangible unit cost for the first 30 years of life lost (YLL) is multiplied by a discount rate of 1.5% to convert future costs into present values, and we use a declining rate of 1.29% for years beyond 30 years (49). For the male age group 45 to 49, this produces a discounted intangible unit cost of one suicide equivalent to £1.6 million. The discounted intangible unit cost is multiplied by the excess number of deaths from suicide to yield the excess intangible cost of death from suicide associated with problem gambling.

## Results

Table 8 presents the results of the estimated number of suicides associated with problem gambling or gambling disorder in England in 2021 to 2022 prices. The estimate of between 117 and 496 suicides associated with problem gambling or gambling disorder results in a cost of £241.1 million to £961.7 million. This cost represents the societal value of the life years lost as a result of excess suicides associated with gambling.

**Table 8. Excess cost of suicides associated with problem gambling or gambling disorder in England**

Description of estimate	Estimate
Estimate of the number of suicides in the problem gambler or gambling disorder population if the suicide rate were equivalent to the rest of the population	16 to 20
Estimate of the actual number of suicides in the problem gambler or gambling disorder population	133 to 516
Estimate of the number of excess suicide deaths associated with gambling disorder (lower bound) and problem gambling (upper bound)	117 to 496
Estimate of the total years of life lost for all persons associated with problem gambling	5,499 to 21,610
Excess intangible costs (£ millions)	241.1 to 961.7

Note: Figures may not sum due to independent rounding.

## Limitations

We acknowledge that applying the Swedish SMR figures to the English gambling population is a limitation of this analysis. For example, Karlsson and Hakansson (36) report the median age of suicide death in Sweden is 32.5 years compared to 47 years in England. This means the results from the Swedish population appear to have a greater concentration of suicides among younger people. Nevertheless, as already noted, there are similarities between the prevalence of problem gambling between the 2 countries (0.6% of the Swedish population and 0.4% of the English population respectively).

The sample used in Karlsson and Hakansson (36) analyses those clinically diagnosed with GD rather than problem gamblers (PGSI 8 or more and DSM-IV 3 or more) or those meeting the criteria for GD in a population survey (DSM-IV 5 or more) but who are not necessarily clinically diagnosed. To apply the SMR from this paper to our analysis we needed to make the assumption that the SMR for the individuals in the Karlsson and Hakansson population is equivalent to the population in this analysis. This analysis applies the figure to both the estimated problem gambling population used throughout our analysis, and the subset of those from HSE meeting the higher threshold of a score of 5 or more using the DSM-IV instrument (but which is a figure subject to greater uncertainty). Using a range in this way reflects the uncertainty over which population size is most accurate and using the SMR 95% CI reflects the uncertainty over the effect size itself.

There is limited evidence as to what extent this assumption holds (applying figures from a clinically diagnosed population to a population of people who are not necessarily clinically diagnosed). It could be argued people receiving treatment are less likely to be suicidal due to the care they are receiving, but it could also be argued that these are more severe cases so are more likely to result in suicide. It is not possible to say with confidence either way. This assumption was agreed at the expert panel and was another contributing factor to us using a range.

Finally, we have assumed no increased risk of suicide associated with people gambling at levels of elevated risk (low and moderate risk).

We recommend that future research builds on the published work by Wardle and others (40) on suicide attempts. There needs to be more research on suicide attempts, but we also need more research to get better estimates of the number of deaths by suicide linked to gambling in England. Also, researchers could use ONS mortality datasets and NHS Digital's Hospital Episode Statistics to develop estimates with higher confidence.

## Alternative papers

A 2020 [Gambling with Lives](#) report estimates deaths related to gambling between 250 and 650 every year in the UK, representing between 4% to 11% of total suicides. We reviewed some of

the papers included in this report, and other notable papers, to provide a sense check for our results.

Appleby and others (91) is a UK based study that examined the deaths by suicide of just over 100 young people aged 20 to 24 years. It found that 4% of suicides were related to gambling (91). The link to gambling was derived from oral reporting where coroners took evidence from families and professionals which means this is likely to be an underestimate. ONS data indicates that the suicide mortality rate increases with age from 20 to 24 years before peaking in the 45 to 49 and 50 to 54 age categories for males and females respectively. This means applying that 4% figure to the whole problem gambling population would likely be conservative. For these reasons, the report from Appleby and others (91) was not used in our main calculations.

Black and others (90) examined the relationship between suicide ideation and suicide attempts in a sample of 95 individuals from Iowa, US, diagnosed with GD. They found that 35.8% of the GD sample had attempted suicide in their lifetime, 13 were before GD was diagnosed. Only 4.4% of the control group had attempted suicide in their lifetime. This paper adds further evidence to the growing literature base connecting the links between an increased risk of suicide and GD. Black and others (90) conducted in-person interviews to measure suicide ideation and attempts rather than measuring suicide deaths.

Wong and others (93) is a physiological autopsy study of pathological gamblers who died by suicide. As this is a Hong Kong study (non-OECD) we decided that their results would not be directly relevant to the UK. This is supported by Hong Kong's gambling prevalence, which is significantly higher than the UK. This paper used DSM-IV criteria to identify individuals with GD and examined 150 suicide cases with 17 showing evidence of GD before their deaths. The age- and gender-matched control showed 1 in 150 showing evidence of GD. Despite not being directly useful in providing inputs for our analysis, their results show a strong correlation between suicidality and GD.

## 4.2. Depression

### Introduction

As part of this update, we conducted a full review of this analysis. We made improvements to the methodology, as well as updating the price year to 2021 to 2022. At the suggestion of the expert panel, we conducted a rapid literature search to identify meta-analyses of cross-sectional studies on the association between gambling and depression. We also quantified the quality of life impacts of the excess depression cases associated with harmful gambling for this update.

The abbreviated systematic review of harms associated with gambling identified 2 longitudinal cohort studies (37, 38) providing evidence on the association between gambling and depression with statistically significant results.

Afifi and others (37) followed up a sample of young adults aged 18 to 20 in Canada for 5 years and surveyed them at 4 timepoints (up to the age of 25 years). This allowed the authors to examine how gambling in one period impacted the mental health of the sampled individual in the next survey and whether the effect size between periods was significantly associated. The study identified at-risk or problem gambling using the PGSI and measured mental health conditions using the Composite International Diagnostic Interview – Short Form instrument. Results showed that gambling was associated with increased odds of major depressive disorder (adjusted odds ratio (AOR) 1.98, 95% CI 1.14 and 3.44), with the odds ratio adjusted for sociodemographic variables. General anxiety disorder and obsessive-compulsive disorder, when analysed separately, had no statistically significant adjusted odds ratio in the past 12 months.

‘Any mental health condition’ was also found to be statistically significant. This groups together depression, general anxiety disorder and obsessive-compulsive disorder. Given depression appears to be the main condition behind these results, this analysis identifies the cost of depression associated with gambling only.

Emond and others (38) conducted a longitudinal prospective study of gambling in late adolescence and early adulthood in England. The analysis used the Avon Longitudinal Study for Parents and Children cohort in England. This study followed up children born in the 1990s and collected information when they were aged 17, 20 and 24. The aim was to investigate the antecedents of regular and problem gambling and explore associations with other addictive behaviours and mental health conditions. The study identified at-risk and problem gambling using the PGSI and measured depression using the Computerised Interview Schedule – Revised (CIS-R) assessment tool. Results found that moderate risk of problem gambling behaviour at age 20 was significantly associated with depression at aged 24 years for a small minority of people, reporting an odds ratio of 2.29 (95% CI 1.28 and 4.12).

The expert panel convened to discuss actions for this update discussed these 2 studies, and their limitations. They agreed that Afifi and others focuses on a relatively small age group. And while its longitudinal power is useful for establishing evidence of causality, a study of a wider demographic would be preferable. Despite Emond and others being a UK based study, it has the limitation of focusing on individuals within a narrow age band. Again, this reduces our ability to generalise the study. Given these limitations, and the fact that we did not identify any other suitable longitudinal studies, the expert panel suggested the most robust approach would be to explore the use of cross-sectional studies, focusing on the strengths offered by meta-analyses.

We examined the meta-analyses included in the abbreviated systematic review of harms associated with gambling and a senior information specialist at the UK Health Security Agency



(UKHSA) conducted a rapid search for appropriate meta-analyses published in the meantime. The results were assessed by the OHID Evidence and Evaluation Team. The review returned 3 appropriate meta-analyses, and each was assessed using AMSTAR-2 (a critical appraisal tool for systematic reviews) to assess their quality.

Allami and others (84), which was published after the abbreviated systematic review of harms associated with gambling, focused on collecting cross-sectional studies published between 2012 and 2019, looking at a range of gambling risk factors in the general population. Depression was one of the identified risk factors included in the meta-analysis. The study identified 17 papers that explored the effect size between problem gambling and depression. These studies looked at populations with a range of age groups from high-income western countries, with the exception of one paper looking at a South Korean population.

The  $I^2$  statistic represents the total variation across studies included in the meta-analysis due to heterogeneity. It's expressed as a percentage so it can range from 0% to 100%. High heterogeneity (and a high  $I^2$  figure) means there is high variability in the results of the studies included in the meta-analysis, and low variability for low heterogeneity (and a low  $I^2$  figure). For this meta-analysis, the  $I^2$  statistic is 66%, which suggests moderate heterogeneity. The computed weighted mean OR is reported as 3.29 (95% CI 2.73 and 3.97).

Lorains and others (85), which was captured in the abbreviated systematic review of harms associated with gambling, explored the prevalence of comorbid disorders in problem and pathological gamblers, looking at non-treatment seeking gamblers covering a wide range of ages. They gathered evidence from 6 cross sectional papers published between 1998 to 2010, from high-income western countries and South Korea. A range of diagnostic tools were used to identify problem and pathological gamblers, and the predominant tools were DSM and PGSI. The weighted mean effect size reported is 23.1% (no CI recorded). The  $I^2$  is moderate at 46.9%.

Dowling and others (86) explored the prevalence of comorbidities in treatment seeking problem gamblers. The paper is a high-quality meta-analysis, collecting 17 cross-sectional studies published between 1992 and 2006. The populations explored had a wider range of ages, predominantly came from higher income western countries and were treatment seeking. As a result of being treatment seeking, the majority of papers used clinical based tools to determine whether a gambler was a problem gambler or otherwise. The  $I^2$  is very high at 93.7%, meaning heterogeneity is high in the reported effect size. The weighted mean effect size was 29.9% (95% CI 20.5 and 41.2%).

Of the 3 papers identified, Allami and others (84) was chosen as the most suitable as it was the most recent, and the highest quality meta-analysis of the 3 using the AMSTAR-2 tool. It also looked at non-treatment seeking gamblers and examined a wider range of papers. This increased our ability to generalise the effect size, in addition to having a more reasonable  $I^2$  in comparison to Dowling and others (86).

## Methodology

### Data inputs

We have estimated the excess depression cases associated with moderate-risk or problem gambling and then calculated the related healthcare costs and quality of life (QoL) losses. The healthcare costs represent a cost to government, and the QoL losses represent a societal loss, which is in line with the perspective of our analysis (see section 2.2 for more details). The analysis draws on several parameters from the literature, [HMT Green Book](#) and published datasets to calculate these estimates:

1. The prevalence of people experiencing moderate-risk and problem gambling (3). We did not find an association between low-risk gambling and increased rates of depression based on the available evidence (50).
2. The prevalence of depression in the adult population published by NHS Digital, reported at 11.6% in 2019 to 2020.
3. The association between harmful gambling and depression from a meta-analysis of cross-sectional studies (A84).
4. The QoL loss from depression, estimated to be -0.1123 (88).
5. The average duration of an episode of depression, from a Dutch cohort study (Have and others 2017).
6. The societal value of a quality adjusted life year (QALY), £70k, following guidance in the [HMT Green Book](#).

We sourced the annual direct cost of depression from a study by Public Health England (51). The cost includes primary care (GP time), secondary care and prescription costs. It also refers to the total healthcare costs of an individual suffering from depression, rather than just the cost of treating their depression. In 2015 to 2016, this was estimated at £1,392 for men and £1,686 for women. We have updated all unit costs to 2021 to 2022 prices using the [HMT GDP deflator](#).

To estimate the impact depression has on an individual's quality of life we have used estimates from Sullivan and others (88). This study was designed to provide a catalogue of community-based EQ-5D index scores for a range of health conditions based on UK preferences. These scores are to be used in cost-effectiveness analyses and public health applications in the UK. The EQ-5D is a preference-based health-related quality of life measure, which is recommended by the National Institute for Health and Care Excellence (NICE). The study uses regression methods to estimate the marginal disutility of each included health condition (using ICD-9 codes), controlling for co-variates (including age, gender, race and education level). Disutility is the harmful effects associated with a particular activity or process, especially when carried out

over a long period. The disutility for the ICD-9 code 311 (depressive disorder, not elsewhere classified) was used given it was the only code that included depressive disorders, and other relevant codes that covered a wider range of conditions, such as 296 and 311, had similar disutility figures. The estimated disutility for ICD-9 code 311 is -0.1123.

To provide an estimate of the average duration of depression, we sought expert opinion on the most appropriate piece of literature to use, which was identified to be ten Have and others (87). This study used data from a Dutch cohort study that was nationally representative of the adult population to estimate the average duration of depressive episodes. The study found that the mean duration of a minor depressive episode was 8.7 months, and the mean duration of a major depressive episode was 10.7 months. The combined mean duration for minor and major depressive episodes was 10.2 months. To be conservative, for this modelling we have used the mean duration of a minor depressive episode (8.7 months) in our calculations. We are aware this may be an underestimate, given the excess cases associated with depression will be a mix of both minor and major depressive episodes, and an individual may have more than one depressive episode. The ten Have study may also underestimate the duration given it looks back at how long individuals have been experiencing their depression and is not able to consider how long they continue to suffer from depression once data collection had ended.

## Calculations

To estimate the number of excess depression cases associated with moderate-risk and problem gambling (abbreviated here as MPG), we first estimate the expected number of depression cases in the MPG population if they had no cases associated with MPG. To do this, we must adjust the prevalence rate for depression in the NHS Digital's Quality and Outcomes Framework (QOF) to estimate the depression prevalence for non-gamblers. So, we used the following equation:

$$x = y / ((1-g)+gRR)$$

Where x is the non-MPG depression rate, y is the total population depression rate, g is the proportion of the population engaging in moderate-risk or problem gambling, and RR is the relative risk from Allami and others.

Allami and others provide both an odds ratio (OR) and a relative risk (RR) in their publication. We were able to replicate the conversion from OR to RR they made, which led to a RR of 3.08 (95% CI 2.60 to 3.65).

This non-MPG depression rate is the estimated depression rate in the population, in the absence of any depression cases associated with moderate-risk or problem gambling. This figure is then used to calculate the number of expected depression cases among moderate-risk and problem gamblers, in the absence of any cases of depression associated with MPG. To do

this, the figure is multiplied by the sex and age specific population estimates of moderate-risk and problem gamblers.

We used slightly different methods to work out the actual number of depression cases within the problem and moderate gambling population. To estimate the actual number of depression cases among people engaging in problem gambling, the relative risk from Allami and others is multiplied by the expected number of depression cases in this population. We are assuming this RR can be applied to both sexes and is age invariant. The actual number of cases minus the expected number of cases without problem gambling-associated cases gives us the excess number of depression cases in the problem gambling population.

For people engaging in moderate-risk gambling, the same calculation is made. However, the relative risk is modified to reflect that difference in probability of depression in those engaging in moderate-risk and problem gambling. The literature suggests that the impact of gambling on depression is lower for moderate-risk gamblers, so this calculation changes the relative risk to reflect that smaller expected effect size.

To calculate the adjustment, we averaged 3 different measures of depression from HSE. For the co-occurrence of mental health conditions for non-problem gamblers or non-gamblers, moderate-risk and problem gamblers we used the following metrics.

1. The 12-item General Health Questionnaire (GHQ-12). This is a screening tool that is a measure of mental health conditions. A score of 4 or more indicates probable psychological disturbance or mental ill health.
2. The ILLAFF7 is a metric available in the HSE, and we have looked at the number of individuals stating that they have a long-lasting illness that affects their mental health.
3. The Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) is a widely used measure of subjective and psychological functioning. We have looked at the number of individuals in the lowest quintile of WEMWBS scores that are from each of these population groups.

The figures for GHQ-12 and ILLAFF7 use HSE 2012, 2015, 2016 and 2018. The figures for WEMWBS use HSE 2012, 2015 and 2016, as these questions were not included in HSE 2018.

For each measure, the difference in the prevalence of this marker for a mental health condition between the non-harmful gambling and medium-risk gambling populations is divided by the difference in the prevalence between the non-harmful gambling and problem gambling populations. This is averaged over the 3 measures, which gives a figure of 0.358. In other words, 36% of the increased risk of depression that exists for those engaging in problem gambling and depression exists for those engaging in moderate-risk gambling and depression. We assume this is an accurate and fair reflection of the relationship between moderate-risk gambling and depression.

To reflect the relative risk of those engaging in moderate-risk gambling, 1 is subtracted from the RR from Allami and others (84) and the remaining value is scaled using the adjustment factor (36%). We then add 1 back to the RR, to provide a relative risk for those engaging in moderate-risk gambling. This RR is then multiplied by the expected number of depression cases in the moderate-risk gambling population, to give the actual number of cases for this population. The actual number of cases minus the expected number of cases gives us the excess number of depression cases in the moderate-risk gambling population.

Excess depression cases in the low-risk gambling population are assumed to be zero as there was not clear evidence in the literature or analysis of the HSE that there is a significant relationship between increased depression and low-risk gambling.

We then estimate the excess healthcare costs of the depression cases associated with moderate-risk and problem gambling. This is a financial cost to government. To do this, we multiply the excess cases in the moderate-risk and problem gambling populations by the annual cost per case of an individual with depression. This annual cost per case differs by gender, so is applied to the number of cases in each gender and summed to give the total figure.

We also estimate the quality of life impacts of the excess depression cases associated with gambling. This is an intangible cost to society. To calculate the annual QALY loss for an individual case of depression, the reduction in QoL is taken from Sullivan and others and is multiplied by the average duration of disease for depression. The figure of 8.7 months from ten Have and others is divided by 12, to give the proportion of one year that we estimate to see this QoL reduction for this calculation. This annual QALY loss is then applied to the excess cases in the moderate-risk and problem gambling populations, to give the total annual QALY loss of excess depression associated with gambling. This QALY loss is then monetised using the £70k per QALY figure from the [HMT Green Book](#). This gives us the societal value of the QALY loss of excess depression cases associated with gambling.

## Results

In England, we estimate that there are 69,099 people with depression associated with moderate-risk and problem gambling. This equates to £114.2 million of excess healthcare costs, which is a cost to government, and QALY losses of £393.8 million, which is a societal cost. All costs are provided in 2021 to 2022 prices.

The results in table 9 present the full results, with the upper and lower bound estimates. The upper and lower bound estimates are calculated using the 95% confidence interval figures for the moderate-risk and problem gambler populations.

**Table 9. Excess cost of depression associated with harmful gambling in England**

Description of estimate	Estimate	Lower and upper bound
Estimate of those engaging in moderate-risk and problem gambling expected to have depression without cases associated with harmful gambling	59,949	41,686-78,314
Estimate of the total number of people engaging in moderate-risk and problem gambling expected to have depression	129,048	87,721-170,651
Estimate of the number of excess depression cases associated with moderate-risk and problem gambling	69,099	46,035-92,336
Excess healthcare costs (£ millions)	£114.2	£75.4-£154.6
QALY losses due to excess depression cases	5,626	3,748-7,518
Societal value of QALY losses (£ millions)	£393.8	£262.4-£526.2

Notes: Figures may not sum due to independent rounding. Lower and upper bound estimates are based on the lower and upper bounds of the 95% confidence interval for the number of people engaging in harmful gambling.

## Limitations

Despite the strengths of the evidence used in the analysis (37), the evidence is from cross-sectional studies and so we are estimating the excess cases associated with gambling. This is discussed further in section 2.6. In addition, the Allami study reports a median baseline prevalence rate in the papers analysed of 3%, substantially less than the UK baseline. This may reflect the fact that “anxiety and depression issues were assessed differently across studies”.

We recommend that analysis exploring the causal relationship between gambling and depression continues, focusing on longitudinal studies covering a large age range and in a UK setting. Research that produces results that can be differentiated by level of gambling risk (low-risk, moderate-risk and problem gambling) and depression (mild, moderate, severe) would also support further analysis.

For the estimated quality of life impacts, we are using an estimate of the average length of a depressive episode. The study used looks back to see how long an individual has been suffering from depression but cannot consider how long their depression continues after data collection ends. It may also be possible for an individual to suffer from multiple episodes per year. This means the results presented may be an underestimate of the true quality of life impacts. This study uses Dutch data, and so we are assuming the results are generalisable to the UK population. In the future, we recommend further analysis estimating the full length of depressive episodes, and their frequency in a UK setting.

The EQ-5D, which is a preference-based health-related quality of life measure, is used in the QoL calculations. It uses self-reported data on an individual's health state, using a questionnaire that captures 5 dimensions, which are:

- mobility
- self-care
- usual activities
- pain and discomfort
- anxiety and depression

There is some evidence that while EQ-5D reflects the impact of common mental health conditions, it may be less sensitive to more complex and severe mental health conditions. This means that the estimated QoL loss from depression may be an underestimate.

These estimated costs also only relate to the individual experiencing depression. There may be impacts on the wellbeing and potentially the health of the partners and families of these individuals. There may be a cost of informal care that is provided to individuals suffering from depression, which is a wider societal cost.

Finally, the Allami and others paper (84) reported a significant increase in anxiety issues associated with at-risk or problem gambling. These were not included in this analysis but suggest there may be excess cases and costs of other mental health issues associated with harmful gambling.

## 4.3. Alcohol dependence

### Introduction

We reviewed the analysis in section 4.3 and made minor improvements to the methodology, as well as updating the price year to 2021 to 2022 as part of this update. We did not conduct a full review of the methodology for this area, and we did not re-review the evidence used to inform assumptions, since this was not in scope of the update. It was also out of scope to update other data sources.

[PHE's gambling-related harms evidence review](#) quantitative analysis and abbreviated systematic review of harms associated with gambling studies both reported evidence on an association between gambling and alcohol. One longitudinal cohort study identified reported a statistically significant association between gambling and alcohol dependence (37). The

longitudinal analysis by Afifi and others (37) compared the interaction between gambling over the previous year and alcohol dependence in Canada. The study identified at-risk or problem gambling using the PGSI and measured alcohol use using the Alcohol Dependence Scale. Results showed that harmful gambling was associated with increased odds of alcohol dependence by a ratio of 2.2 (95% CI 1.17 and 4.13) in adults aged 18 to 20, where the odds ratio was adjusted for sociodemographic variables. We considered that the evidence from this study could be generalised to the English context, given [OECD data on alcohol consumption](#) reports that the UK (9.7 litres per capita) is broadly comparable with Canada (8.1 litres per capita). The OECD defines alcohol consumption as the annual sales of pure alcohol in litres per person and it is measured in litres per capita (people aged 15 years or older).

## Methodology

### Data inputs

The analysis uses several parameters from the literature and nationally published datasets:

1. The prevalence of people experiencing harmful gambling (3).
2. The prevalence of alcohol dependence for adults in England from PHE's alcohol dependence prevalence estimates (53). This reported that 602,391 individuals were alcohol dependent in 2018 to 2019 and the alcohol dependence prevalence rate was 1.368 per 100 of the adult population.
3. The number of people in community treatment for alcohol dependence from the National Drug Treatment Monitoring System (NDTMS) [Adult substance misuse treatment statistics 2018 to 2019](#). This was about 75,500 people. Comparing the number in treatment to the alcohol dependence prevalence estimates, there were about 13% in community treatment in 2018 to 2019.
4. The association between gambling and alcohol dependence from a longitudinal study in Canada (as well as baseline alcohol dependence prevalence in that study) (37).

Community alcohol treatment is funded by local authorities through the public health grant. We combined datasets on local authority reported expenditure on substance misuse treatment published by DLUHC (formerly Ministry of Housing, Communities and Local Government) with [NDTMS treatment statistics](#) on total days in community treatment. This gave us the annual cost per individual receiving alcohol treatment, estimated at £1,248 in 2018 to 2019 prices (54 to 56). This was uplifted to £1,356 in 2021 to 2022 prices using the [HMT GDP deflator](#). The analysis does not consider the costs of NHS treatment.



## Calculations

Given the lack of available data, we assumed that the alcohol dependence prevalence rate is constant across all age groups. From this and the research estimate of the increased odds of alcohol dependence associated with harmful gambling (adjusted-OR 2.2 (37)), we calculated an alcohol dependence prevalence rate for people participating in harmful gambling and an alcohol dependence prevalence rate for those who do not engage in harmful gambling (including those who do not gamble at all).

This first required converting the odds ratio (OR) to a relative risk (RR), using the formula:

$$RR = OR / ((1-x) + xOR)$$

Where x represents the alcohol dependence prevalence in the non-gambling or non-harmful gambling population. See the [odds ratio to risk ratio method](#) we used.

We used the figure for x from the Afifi and others paper that provided the odds ratio (37), which is 11.8%. This is substantially higher than the overall rate for England (1.3%). This may be due to the young sample in the Afifi paper (37), the Canadian context or the sample recruitment approach, which involved recruitment in casinos and video lottery terminal sites. Using this higher baseline results in a lower relative risk of gambling-related alcohol dependence than using the England rate, so is a conservative assumption. This adjustment led to a relative risk of 1.93: in other words, engaging in harmful gambling is associated with a 93% higher chance of being dependent on alcohol.

This then allowed us to use the following formula:

$$y = (1-g)x + gxRR$$

Where y is the whole population alcohol dependence prevalence rate, g is the proportion of those participating in harmful gambling in the population, x is the alcohol dependence prevalence rate for those not participating in harmful gambling and RR is the relative risk. Solving for x, this gave a non-gambling or non-harmful gambling population alcohol dependence prevalence of 1.2% and an alcohol dependence prevalence of 2.4% for the population participating in harmful gambling.

Applying these percentages in turn to the harmful gambling population, this suggests that without gambling-associated alcohol dependence, there would be 22,282 people engaging in harmful gambling with alcohol dependence, but in reality we expect there are 42,941. This gives an excess number of people with alcohol dependence associated with harmful gambling of 20,658.

We considered the costs to the alcohol treatment sector only. This was to avoid double-counting with other areas of this report, which calculated direct or intangible costs associated

with harmful gambling. This involves estimating the number of alcohol dependent individuals in community treatment. Multiplying the excess individuals with alcohol dependence associated with harmful gambling by the 13% of people calculated to be in community alcohol treatment in 2018 to 2019, nationally, gives the number in treatment; multiplying this by the unit cost of treatment estimates the excess direct cost of people in alcohol treatment associated with harmful gambling. This is a financial cost to government.

## Results

The analysis estimates 20,658 have alcohol dependence associated with harmful gambling, and of these, 2,591 receive alcohol treatment in England. This equates to £3.5 million in 2021 to 2022 prices. This is a financial cost to government. Table 10 presents the results.

**Table 10. Excess cost of alcohol dependence associated with harmful gambling in England**

Description of estimate	Estimate	Lower and upper bound estimates
Estimate of the number of alcohol dependent at-risk and problem gamblers if the alcohol dependence rate was the same as for those not engaging in harmful gambling	22,282	17,591-26,820
Estimate of the actual figure in this population	42,941	33,900-51,685
Estimate of the number of alcohol dependent people associated with at-risk and problem gambling	20,658	16,309-24,865
Estimate of the number of alcohol dependent people in treatment associated with at-risk and problem gambling	2,591	2,046-3,119
Excess direct costs (£ millions)	3.5	2.8-4.2

Notes: Figures may not sum due to independent rounding. Lower and upper bound estimates are based on the lower and upper bounds of the 95% confidence interval for the number of people engaging in harmful gambling.

## Limitations

The analysis has several limitations. First, the Afifi paper (37) looks at a sample of young adults in Manitoba, Canada, with a much higher baseline rate of alcohol dependence. We assume the increased likelihood of alcohol dependency associated with gambling in this population is applicable to the England population. Additionally, results reported by Afifi and others show an increased risk for at-risk and problem gamblers, where gambling severity was grouped by at-risk and problem gamblers due to a lack of meaningful difference between type of gambler. This means our analysis cannot differentiate the risk of gambling associated with alcohol dependence by type of gambler.

Second, given the limited data on the number of people in the general adult population who are alcohol dependent by age, we assume that the prevalence rate is equal across all age groups.

Third, the analysis assumes that an individual engaging in harmful gambling who is alcohol dependent has the same behavioural characteristics as other alcohol dependent individuals. We use NDTMS data on the proportion of the prevalent alcohol dependent individuals who are in community treatment and apply this to the excess number of cases associated with harmful gambling.

The analysis includes only the direct costs to government of community alcohol treatment. This is a conservative assumption as there are also other additional costs associated with alcohol dependent individuals (37), that would fall to government and wider society. For example, the indirect costs associated with crime or lost productivity. Given these costs do not fit with our chosen perspective (see section 2.2 for further details), we explore a broader perspective to cost alcohol dependence in the sensitivity analysis (see chapter 7 Discussion).

We recommend further consultation with experts working in addiction to develop a more robust methodology to explore the causal relationship between harmful gambling and alcohol dependence. This methodology could use a larger sample of people with alcohol dependence experiencing harmful gambling to produce results that can be differentiated by level of harmful gambling (low-risk, moderate-risk and problem gambling).

## 4.4. Illicit drug use

### Introduction

We reviewed the analysis in section 4.4 and made minor improvements to the methodology, as well as updating the price year to 2021 to 2022 as part of this update. We did not conduct a full review of the methodology for this area and did not re-review the evidence used to inform assumptions, as this was not in scope of the update. It was also out of scope to update other data sources.

[PHE's gambling-related harms evidence review](#) quantitative analysis and abbreviated systematic review of harms associated with gambling studies both reported evidence on an association between gambling and harmful use of drugs. This included one longitudinal prospective study addressing the relationship between gambling and drug use. The longitudinal analysis by Emond and others (38) explored the progression of gambling behaviour and associated consequences over time. It used the Avon Longitudinal Study for Parents and Children cohort in England, which collected over 25 years' worth of data across 70 time points. They identified low-risk and moderate-risk or problem gambling using the PGSI. Results found that a small minority of young adults aged 17 to 24 had a low-risk, moderate-risk or problem gambling behaviour associated with subsequent harmful drug use. This study defines illicit drug

use as cocaine, crack and other drugs so we use data on opiate and/or crack cocaine users (OCU) published by the NDTMS for our analysis. The adjusted odds ratio (AOR) for illicit drug use indicated 1.49 (95% CI 1.07 and 2.06) times greater odds for younger adults (aged 17 to 24) who were low-risk gamblers and 1.95 (95% CI 1.06 and 3.61) times greater odds for younger adults (aged 17 to 24) who were engaging in moderate-risk or problem gambling.

## Methodology

### Data inputs

The analysis uses several inputs sourced from the literature to quantify harms and routinely published datasets on prevalence:

1. Age-standardised prevalence of those engaging in harmful gambling (see appendices for details).
2. The research estimate of association between harmful gambling and illicit drug use among people aged 17 to 24 years in a longitudinal study in England by Emond and others (38). They report an AOR of 1.49 among people engaging in low-risk gambling and an AOR of 1.95 for moderate-risk or problem gambling.
3. The national prevalence rate of people who use illicit opiates and/or crack cocaine (or opiate and crack cocaine users (OCUs)) published by PHE. This reported 314,000 OCUs in 2016 to 2017 (latest data available) and prevalence rates per 1,000 of the adult population disaggregated by 3 age bands: 15 to 24 years, 25 to 34 years and 35 to 64 years (58).
4. Annual cost per case for an individual in drug misuse treatment for opiates and/or crack cocaine use, estimated at £2,644 in 2018 to 2019 prices (56) (see below).

Given that the evidence from Emond and others (38) reports on younger adults aged 17 to 24, the analysis uses the OCU prevalence rate for 15 to 24 years only, equivalent to 4.62 per 1,000 people. PHE reports data on the national average number of OCUs not in community treatment (in 2017 to 2018) on its public health profiles database (59), estimated at 52.1% for 2017 to 2018. From this, 47.9% of people are calculated to be in community treatment.

Like alcohol treatment, community drug treatment is funded by local authorities through the public health grant. DLUHC publishes data on local authority annual reported expenditure on adult drug treatment (55). Activity data on the total number of days in treatment are provided by [NDTMS treatment statistics](#). We have used these datasets to calculate the average cost per person in drug treatment, estimated at £2,687 in 2018 to 2019 prices (56). We updated unit costs to 2021 to 2022 prices using the [HMT GDP deflator](#), resulting in an annual cost of £2,920. The analysis does not consider the costs of NHS treatment.

## Calculations

Using the same formula as described in the alcohol dependence section above, we converted the odds ratios to relative risks. However, unlike with alcohol dependence, baseline figures on OCUs in the study population was not available. So, we used the England value for 15 to 24 year olds as a proxy (4.62 per 1,000 people). This adjustment led to relative risks of illicit opiate and/or crack cocaine use given harmful gambling of 1.49 for low-risk gamblers and 1.94 for moderate-risk or problem gamblers.

Like the alcohol analysis, we used these figures, alongside the proportion of people engaging in harmful gambling in the population (using the 16 to 24 year old population given the age ranges available for gambling prevalence) to establish the expected number of OCUs in that population without any illicit opiate and/or crack cocaine use associated with harmful gambling. This gave us a figure of 2,125 16 to 24 year old OCUs in the population engaging in harmful gambling. Applying the relative risks, we estimate the actual number of 16 to 24 year old OCUs among those engaging in harmful gambling of 3,437. So, a figure for the number of cases where use is associated with harmful gambling of 1,312.

Using the same approach as for costing alcohol dependence, we took the approach of monetising the number of illicit opiate and/or crack cocaine users associated with harmful gambling from the community treatment perspective. Given the available evidence that 47.9% of OCUs receive drug treatment (over a period of one year), it is estimated that 628 people are in community drug treatment associated with harmful gambling.

This figure is multiplied by the calculated unit cost of drug treatment to estimate the excess direct cost of people in treatment associated with at-risk or problem gambling. This is a financial cost to government.

## Results

The analysis estimates that 1,312 people aged 16 to 24 use illicit opiates and/or crack cocaine associated with at-risk and problem gambling in England. Of these, 628 receive community drug treatment in a given year. This equates to a cost of £1.8 million in 2021 to 2022 prices. This is a financial cost to government. Table 11 presents the results.

**Table 11. Excess cost of 16 to 24 year old illicit opiate and/or crack cocaine users (OCUs) associated with harmful gambling in England**

Description of estimate	Estimate	Lower and upper bound estimates
Estimate of the number of 16 to 24 year olds who engage in harmful gambling using illicit opiates and/or crack cocaine if the OCU rate was the same as for those not engaged in harmful gambling	2,125	1,741-2,446
Estimate of the actual figure in this population	3,437	2,790-4,012
Estimate of the number of illicit OCUs associated with harmful gambling	1,312	1,050-1,546
Estimate of the number of illicit OCUs in treatment associated with harmful gambling	628	503-740
Excess direct costs (£ millions)	1.8	1.4-2.1

Notes: Figures may not sum due to independent rounding. Lower and upper bound estimates are based on the lower and upper bounds of the 95% confidence interval for the number of people engaging in harmful gambling.

## Limitations

The results present only a partial picture of the total cost, given that the increased odds of illicit drug use reported is for a cohort of adults aged 17 to 24 only (applied to those engaged in harmful gambling aged 16 to 24 given the age breakdowns available), and looks only at illicit opiates and crack cocaine. In England, the NDTMS reports higher opiate and/or crack cocaine use prevalence numbers in older age groups. So, we can expect the cost to be significantly higher if there is increased use associated with harmful gambling in these groups too (58).

The analysis makes several assumptions. First, we assumed that an individual engaging in harmful gambling who uses opiates and/or crack cocaine has the same behavioural characteristics as someone using opiates and/or crack cocaine who does not gamble or does not engage in harmful gambling. We use NDTMS data on the proportion of the prevalent OCUs who are in treatment and apply this to the excess number of prevalent OCUs associated with gambling.

Second, the analysis includes only the direct costs to government of drug treatment. This is a conservative assumption as there are additional costs associated with individuals who use opiate and/or crack cocaine that fall on the government and wider society (60) (for example, the direct costs of crime or the indirect costs of lost productivity). Given these costs do not fit with our chosen perspective (see section 2.2 for further details), we explore a broader perspective to costing illicit drug use in the sensitivity analysis (see Discussion).

We recommend further consultation with experts working in addiction to develop a more robust methodology to explore the causal relationship between gambling and illicit drug use. The methodology could use a larger and broader sample of people with drug dependence who are vulnerable to gambling related harms.

## 4.5. Direct quality of life impacts

There is growing evidence showing an association between at-risk and problem gambling and reduced quality of life (QoL) (10, 11, 61). Quality of life can be captured through different measures and used to measure quality-adjusted life years (QALYs). This is a summary metric that takes account of the number of years lived adjusted by the QoL experienced in particular health states. For example, it is not the same to live an additional 20 years in full health or with minor health conditions than to live these 20 years with a chronic health condition. In England, NICE uses QALYs when evaluating the cost-effectiveness of health technologies to be funded by the NHS.

There is evidence that depression and other mental health conditions negatively impact the quality of life of an individual (88). There is evidence that gambling is associated with an increased risk of suffering from depression, and we have used this to estimate the QoL impacts of the excess depression cases associated with gambling. This is covered in section 4.2.

The evidence on the direct impact an individual's gambling status has on QoL in England is scarce given the limited number of economic evaluations on health-related interventions to prevent gambling (2, 9). The international evidence base is slightly more developed (10, 11, 61).

There is emerging evidence from the 2018 HSE (3) on the direct impact harmful gambling has on QoL. This survey uses the EQ-5D-5L instrument, a generic instrument used to measure health, as its QoL measure for people engaging in at-risk and harmful gambling. We have not carried out further analysis to isolate the impact gambling status has on QoL, controlling for other factors that would impact an individual's QoL including the health conditions they suffer from. There is also the risk that the EQ-5D instrument may not be as sensitive to changes in an individual's mental health compared to their physical health. This may mean that the instrument is not able to fully capture the impact that harmful gambling has on a person's QoL. To our knowledge, there is no data available on the duration a person has been in that specific health state for in HSE. So, this data will only give a measure of QoL relating to gambling-related harm at a single point in time, although averages of the population could be taken.

These limitations to estimation mean that we did not consider direct quality of life impacts in the report. However, we have completed analysis on the intangible cost element of death from suicide and the QoL impacts of excess depression cases. These are costs to society.

For future work, we recommend using an instrument more specific to mental health. This may be able to better reflect the direct impact of at-risk and problem gambling on an individual's quality of life.

## 4.6. Gambling treatment

Gambling treatment provision is mainly commissioned by NHS England and the charity GambleAware.

The NHS funds 8 clinics and there is a commitment to roll out 7 more across England as detailed in the NHS Long Term Plan (64). London has the National Problem Gambling Clinic. This has been in operation for over a decade, and recently opened a children and young person's clinic. There are also clinics in Leeds, Manchester, Sunderland, Southampton, Stoke and Telford.

The next areas planned for clinics include the East Midlands, East of England and South West areas of England. The NHS are on track to open the remaining clinics by 2023 to 2024.

GambleAware commission 2 main providers:

1. GamCare, which provides the National Gambling Helpline, as well as remote and community-based treatment.
2. The Gordon Moody Association, which provides residential rehabilitation for men and women, with locations in Dudley, London, Manchester and Wolverhampton. They also provide a counselling and retreat programme for people unable to commit to residential treatment.

GambleAware is funded by voluntary donations that UK gambling operators are required to make as part of the [Gambling Commission licencing conditions](#). Latest total expenditure figures for 2018 to 2019 report that GamCare and the Gordon Moody Association spent £7.9 million on charitable and support activities (62, 63). GamCare and the Gordon Moody Association receive further funding for their work from other sources, including gambling industry stakeholders.

In 2020 to 2021, [GambleAware annual statistics](#) showed there were 7,726 people who accessed treatment for gambling in England through the services above that were open at that time. Of these, 6,524 were identified as gamblers and 1,202 as others who may not directly gamble but whose lives have been affected by those who gamble.

Figures from the HSE (3) on the number of people experiencing problem gambling in England imply that just 2.7% of people experiencing problem gambling accessed treatment in 2020 to 2021. This does not include people engaging in at-risk gambling who may also benefit from treatment and support.



This potentially reflects a lack of access to gambling treatment services in England. OHID is exploring the provision of gambling treatment through a needs assessment, due to be published early 2023. This will provide a baseline of the current system and make recommendations to support improvements to treatment provision.

We expect that there is significant under-reporting of gambling as a reason for hospital admissions. The HES for 2018 to 2019 reports 375 hospital admissions specific to gambling. Hospitals coded these admissions using ICD-10 codes for pathological gamblers (code f63.0) and gambling and betting (code Z72.6) (65). The low use of gambling-specific ICD-10 codes by healthcare professionals suggests that individuals are likely to be diagnosed with another health condition before receiving gambling-specific treatment, such as a mental health condition or substance misuse, which has been found by Pavarin and others (66). It is likely that the direct costs of gambling treatment are instead captured by other health-related costs.

We have not included the direct costs of gambling treatment in our central estimates of the economic burden of gambling. This is due to the severe limitations of the data and lack of studies on the cost-effectiveness of the interventions offered. It also helps us to avoid double-counting with other areas of health harms that we have costed elsewhere (such as the costs of depression).

We need additional research into the effectiveness and cost-effectiveness of specific treatment interventions by type of gambler. NICE is due to publish treatment guidelines in 2024, which may be able to improve our understanding and will make recommendations on the research gaps in this area. We have also commissioned the University of Sheffield to undertake research that will estimate the treatment need and demand for gambling in England, at national and local levels. This research is due in 2023 and will support our understanding of the treatment capacity that is required for gambling.

## 5. Employment and education harms

### 5.1 Introduction

We reviewed the analysis in this section and made minor improvements to the methodology, as well as updating the price year to 2021 to 2022 as part of this update. We did not conduct a full review of the methodology for this area and did not re-examine the evidence we used to inform assumptions.

Langham and others (20) explores different ways in which gambling activity can reduce performance at work and study. The impact of gambling-related harm on work and employment can be wide, such as absenteeism, inability to work or unemployment. The PHE gambling related harms evidence review quantitative analysis report found that harmful gambling is associated with being unemployed and having no educational qualifications.

Work is also very closely linked with financial harms. Loss of employment and subsequent loss of wages will exacerbate financial harms people already experience, although in England they would be partly offset by unemployment benefits. Not taking up employment or study opportunities due to gambling behaviour can have long-term impacts in gaining future employment (or study) and in the ability to generate future income, creating significant legacy harms (20). These harms potentially affect both the people that gamble and their affected others.

The PHE abbreviated systematic review of harms associated with gambling found evidence that gambling can cause employment and educational harms for adults and children. But the evidence is limited in terms of data that can be used to calculate costs in this area. It identified one quantitative study (67) analysing the relationship between gambling participation and academic performance among a population-based sample of twin pairs in Canada. However, there is not a significant impact of gambling participation on academic performance when the analysis controls for impulsivity and socio-family adversity (an index created from parental educational level, parental occupational status and the mother's or father's age at the birth of the first child). Since these results were insignificant, we did not include this evidence in our analysis.

One recent study concludes that gambling is associated with a higher risk of future unemployment in the UK (4). This positive relationship is notably stronger at high levels of gambling, with employed people in the highest percentiles of gambling having a 6% likelihood of experiencing future unemployment. These results draw on a sample of 6.9 million active Lloyds Bank customers in each month of 2013, following them up across the next 5 years between 2014 and 2019. However, this analysis has limitations that prevent us from using the results in this costing analysis. This is mainly because of the lack of co-morbidity data, including

lack of PGSI scores. Even so, it is a valuable study in the growing body of gambling-related research in the UK.

In this area of analysis, the Foundation model (8) refers to the number of job losses or increased claims on the benefit system caused by or associated with gambling activity. This can be estimated using survey and unemployment data.

The analysis undertaken for the cost of employment in our study adopts a government perspective, following what other studies in this area have done or recommend (1, 8, 11). Our perspective for this overall analysis is to present financial costs to government, and the societal value of health impacts, and this is discussed further in section 2.2.

An analysis from a wider societal perspective would take a different approach, for example by undertaking a productivity loss analysis. This is typically done using a human capital approach, measuring the potential lost productivity given the employee's sickness or incapacity to work due to gambling addiction. This type of analysis aims to capture the loss to public or private sector employers from sickness absence. It was not possible to find data on sickness absence due to gambling addictive behaviour. The analysis presented here focuses on estimating the financial costs to government as a result of unemployment associated with gambling. (An analysis from a societal, as opposed to government cost perspective, would also exclude unemployment benefits as these represent transfers between parties in society.)

The analysis follows the same approach taken by Thorley and others (1), where costs are estimated in an indirect way and use different sources of data. Despite its limitations, this is the only estimate made to date in the English context and no better data has been identified to test a different method. Where possible, the analysis updates all the data inputs, as we explained below.

## 5.2 Methodology

The analysis focuses on estimating the excess direct costs of unemployment benefits associated with problem gambling for the financial year 2019 to 2020. It does not include people engaging in low-risk or moderate-risk gambling, due to a lack of available data.

### Data inputs

One of the most important components for this analysis is the probability of a problem gambler claiming unemployment benefits compared to a non-problem gambler (which includes low and mid risk gamblers and non-gamblers). Thorley and others (1) estimate this ratio to be 2.65, which means that problem gambling was associated with being 2.65 times more likely to be claiming Jobseeker's Allowance (JSA) compared with non-problem gambling (significant at 99.9%). This is the only estimate we have found in the literature for England.

The benefits system in England has since changed. The Universal Credit system is now fully implemented and has replaced the previous JSA system. For this reason, the analysis updates most of the inputs in the Thorley and others (1) analysis. However, we still use the probability of claiming unemployment benefits, estimated by Thorley and others (1).

The calculations also require the total number of claims due to lack of employment during the period of analysis. For this, the analysis uses the database Alternative Claims Count (ACC) (specifically 'Table 3 Benefit Group' found in the ACC database) from the Stat-Xplore data portal run by the Department of Work and Pensions (DWP)(68). The ACC statistics measure the number of people claiming unemployment benefits by modelling what the count would have been if Universal Credit had been in place since 2013 with the broader span of people this covers. This allows us to examine previous trends as well as extracting the data for 2019 to 2020. The analysis here is solely for England whereas Thorley and others (1) included data for the whole of Great Britain.

The analysis adds together the 3 different categories reported in the ACC to get a total estimate of the number of people claiming unemployment-related benefit. They are:

1. Jobseeker's Allowance (JSA).
2. Universal Credit: Searching for Work conditionality (excluding people on the health journey pre-Work Capability Assessment).
3. Estimates of those additional claimants who would have been Searching for Work under Universal Credit had it existed over the entire period from 2013.

For the period of analysis 2019 to 2020, we extracted the following data (figures available in Appendix D):

1. Stock of ACCs in England in April 2019 (adding together the categories 'Jobseeker's Allowance', 'Universal Credit Searching for Work' and 'Additional'). This is the total number of people claiming unemployment related benefits in April 2019.
2. The total of ACCs 'on-flows' in England for the period May 2019 to March 2020. On-flows are defined as the number of people claiming unemployment related benefits in month  $t$ , who were not claiming in the previous month ( $t-1$ ).

The data shows a total number of 2,896,988 claims in England for 2019 to 2020.

The analysis also requires an estimate of the cost of an individual being unemployed, which we have taken from the GMCA unit cost database (26). The government (or fiscal) annual cost of an individual being unemployed is estimated to be £13,721 uplifted to 2021 2022 prices.

As Thorley and others (1) note, this annual figure needs to be adjusted by the length of an unemployment spell. The Official Labour Market Statistics Nomis database (69) provides information on the median duration of an unemployment spell using 'off-flows' data. Off-flows are defined as the number of people no longer claiming unemployment related benefits in month,  $t$ , who were claiming in the previous month ( $t-1$ ).

The analysis estimates a historic average duration for the last 5 years (from 2014 to 2015 to 2019 to 2020) of the median duration reported in each month during this period. We used a 5-year period to smooth fluctuations in the economic cycle. The length of an unemployment spell is estimated to be 12.7 weeks for the period 2014 to 2015 to 2019 to 2020. Adjusting the annual figure of £13,721 by a duration of 13 weeks provides an estimate of £3,359 in 2021 to 2022 values.

Finally, we need estimates of the working-age population (16 to 64 years) in England. This was estimated to be 35,049,467 in 2018, according to ONS (70). We use working-age population (rather than active population) to reflect important flows from the inactive population into employment and vice versa.

We sourced prevalence estimates of people experiencing problem gambling (PGSI score of 8 or higher) from the HSE 2018 (3). The central estimate value for England is 168,149 (lower bound 102,185, upper bound, 234,1139 see table 2).

## Calculations

The analysis estimates the number of additional claims for unemployment benefits made by a person experiencing problem gambling compared to a person who is not experiencing problem gambling (which includes those engaging in gambling with no risk of harm, as well as those engaging in low-risk and moderate-risk gambling,).

The number of unemployment benefits claims made per working-age individual is 0.083 (total claims divided by the total working age population). This ratio is then multiplied by 2.65 (this is the probability of a problem gambler claiming unemployment benefits compared to a non-problem gambler). This results in a ratio of 0.219 claims made per working-age person who experiences problem gambling. The difference between the estimated and expected (in the absence of problem gambling-associated unemployment) number of benefits claims per working-age individual produces an estimate of the number of excess claims associated with problem gambling (0.136). This figure is multiplied by the prevalence estimate of problem gambling to calculate the number of unemployment benefits claims associated with problem gambling in 2019 (22,932: lower bound 13,936, upper bound 31,928).

The estimated number of claims associated with problem gambling is then multiplied by the cost of one unemployment spell (£3,359) to calculate the excess direct cost of unemployment benefits associated with problem gambling. This is a financial cost to government.

## 5.3 Results

The excess costs to government of unemployment benefits associated with problem gambling is estimated to be £77 million (lower bound £46.8 million, upper bound £107.3 million) in 2019 to 2020 (2021 to 2022 prices). This is a financial cost to government.

The results presented in table 12 are at the top of the range reported by Thorley and others (1) for England, which estimated costs between £30 and £80 million. This is partly due to updating the costs of unemployment benefits received by individuals, but also other parameters such as the number of claims submitted during the period of our analysis. During this period, we saw 40% more claims for the general adult population (in our baseline calculations) than in Thorley and others (1).

**Table 12. Excess cost of unemployment benefits associated with problem gambling in England**

Description of estimate	Estimate	Lower and upper bound
Estimate of the number of people engaging in problem gambling who receive unemployment benefits, based on the number of claims made by the general population.	13,898	8,446-19,350
Estimate of the number of people engaging in problem gambling who receive unemployment benefits, based on the research estimate of the number of claims made by people who engage in problem gambling	36,830	22,382-51,279
Estimate of the number of unemployment benefit claims associated with problem gambling	22,932	13,936-31,928
Excess direct costs (£ millions)	77.0	46.8-107.3

Notes: Figures may not sum due to independent rounding. Lower and upper bound estimates are based on the lower and upper bounds of the 95% confidence interval for the number of people engaging in harmful gambling.

## 5.4 Limitations

We only estimated results for the problem gambling population, excluding people engaging in at-risk gambling (low and moderate risk), since the evidence is limited for this group. Also, the only figure for England available from the literature is the estimate of people engaging in problem gambling being 2.65 times more likely to claim for unemployment benefits than the rest of the gambling population. The results may also be sensitive to other parameters, such as the number of claims for unemployment benefits, which are likely to vary according to the economic cycle.

These costs are estimated in an indirect way and under a set of assumptions we explain above. Ideally, more accurate analysis could be done if data were available from a national registry or equivalent, like NDTMS.

Finally, the analysis does not capture other types of costs such as indirect or intangible costs related to unemployment. It only refers to one part of work harms overall, as we have not included any wider societal costs of unemployment, such as the cost of absenteeism and other potential harms due to a lack of data and the perspective of the analysis.

For future work, we recommend collecting information and evidence on the impact of both at-risk and problem gambling on productivity (absenteeism, inability to work or study and unemployment) with a representative sample of the population of interest in England.

## 6. Criminal activity

### 6.1 Introduction

We reviewed the analysis in this section, and made minor improvements to the methodology, as well as updating the price year to 2021 to 2022 as part of this update. We did not conduct a full review of the methodology for this area, and we did not re-review the evidence used to inform assumptions, as this was not in scope of the update. It was also out of scope to update other data sources.

The [PHE abbreviated systematic review of harms associated with gambling](#) found some evidence of an association between problem gambling and criminal activities. A range of international studies have consistently found that there is a higher proportion of people who are experiencing problem gambling in prison populations than there are in the non-prison population (10, 71 to 73).

Lahn and Grabosky (71) suggest that despite the prevalence of the link between gambling and offending, the literature has not established a clear causal link. They found that:

- for some people experiencing problem gambling their offending is “instrumental to their gambling”
- in many cases there is a “co-symptomatic” relationship between problem gambling and crime
- there were instances where people’s offences are simply “coincidental to their gambling”

May-Chahal and others (72) attempted to address this issue of causality in their study in which they surveyed a sample of the prison population in England. They conducted a survey of 2 prisons in England, one male and one female, receiving a total of 423 responses. The survey focused on gambling behaviour before being in prison to construct PGSI scale scores and included questions that were designed to assess whether gambling was related to current offending.

The survey found that 10.4% of men and 5.9% of women were experiencing problem gambling, using the PGSI scale. This was significantly higher than the rates among the general adult population, which were reported at 0.4%. Respondents were also asked whether they considered that their current offence was linked to gambling. They found that 5.4% of men and 3% of women considered that their current offence was linked to gambling.



## 6.2 Methodology

To calculate the criminal justice system costs associated with problem gambling in England, the analysis estimates the direct cost of imprisonment associated with the estimated prison population that have committed offences associated with problem gambling. This is a financial cost to government.

### Data inputs

The Ministry of Justice (MOJ) records the prison population in England and Wales on a monthly basis, typically on the last day of each month (74,75), and publishes [a monthly population bulletin](#). Between April 2018 and March 2020, according to MOJ statistics, the adult prison population in England and Wales was 81,639 (estimated to be 76,741 for England only).

For the central (and low) estimates, the analysis adopts a somewhat conservative approach, measuring problem gambling in the prison population by using the figures that directly link offences to gambling. Based on MOJ data between 2018 and 2020, the average male proportion of the prison population was 95.53% (74, 75). So, using the survey figures from May-Chahal (72), the weighted proportion of the total prison population that linked their current offence to gambling is 5.29%.

We used the following formula:

$$\text{Weighted average} = (G_M * P_M) + (G_F * (1 - P_M))$$

Where:

$G_M$ =% of males that link current offence to gambling

$G_F$ =% of females that link current offence to gambling

$P_M$ =% of males in prison, on average

While our analysis looks only at the cost of gambling in England, the MOJ aggregates prison statistics across both England and Wales. So, we have adjusted prison statistics using the proportion of crimes committed in England.

The May-Chahal study also collected survey information that measured the rate of problem gambling among participants (scoring 8 or more on the PGSI scale). The survey found that 10.4% of men and 5.9% of women were defined as problem gamblers, amounting to a weighted prison population rate of 10.2%.

Both prevalence estimates are significantly higher than the prevalence of problem gambling among the non-prison population in England. According to the PGSI central prevalence figure, there are 168,149 problem gamblers (95% CI 234,113 and 102,185). Combining these figures with the 2019 ONS mid-year population estimates (70) of the adult population in England, the national prevalence rate of problem gambling is estimated to be 0.4% (95% CI 0.5% and 0.3%).

## Calculations

Using these national prevalence rates of problem gambling, it is possible to estimate the expected number of problem gamblers in the prison population if problem gamblers were proportionately represented in the prison and general populations. The estimated number is 318, using the central population estimates for the number of people experiencing problem gambling). We can then compare this with the research estimate of problem gambling in prison from May-Chahal and others (72) to calculate the actual expected number of people in the prison population who have linked their offence to problem gambling (4,062). The difference between these 2 figures produces an estimate of the excess number of people in prison associated with problem gambling (3,744).

The analysis combines these prevalence and population estimates with the direct costs of imprisonment to calculate the excess imprisonment costs associated with problem gambling. HM Prison and Probation Service compiles unit costs per prisoner on an annual basis (25, 75). In 2019, this was estimated to be £41,136 per prisoner, representing a weighted average across public sector and contracted-out prisons. We updated unit costs to 2021 to 22 prices using the [HMT GDP deflator](#). This is a financial cost to government.

## 6.3 Results

The estimate of 3,744 people in prison associated with problem gambling is equivalent to an excess direct cost of £167.3 million. Table 13 contains the rounded results for our central estimates and the 95% CI upper and lower bound population estimates. This is a financial cost to government.

We calculated our estimate by comparing a research estimate for the prison population to rates of problem gambling in the general population. The upper and lower bound estimates are constructed based on the following.

The upper and lower bounds of the 95% confidence interval for problem gambling prevalence in the general population, uses the upper bound population estimate for the lower bound scenario, as that results in fewer excess numbers of people in prison associated with problem gambling.

Different research estimates of the prevalence of problem gambling in the prison population. For both the lower bound and central estimate, we used the weighted average of the proportion of prisoners whose current offence was linked to gambling in two English prisons, 5.29% (72). For the upper bound, we used the weighted rate of problem gambling in two English prisons, 10.20% (72).

**Table 13. Excess cost of imprisonment associated with problem gambling in England**

Description of estimate	Estimate	Lower and upper bound
Estimate of the number of prisoners who are problem gamblers based on the prevalence of problem gambling in the general population	318	443-193
Estimate of the number of prisoners who are problem gamblers based on the research estimate of the prevalence of problem gambling in the prison population	4,062	4,062-7,827
Estimate of the excess number of people in prison associated with problem gambling	3,744	3,619-7,633
Excess direct costs (£ millions)	167.3	161.8-341.2

Note: Figures may not sum due to independent rounding.

## 6.4 Limitations

Despite the strengths of the evidence used, the analysis has several limitations. First, the approach relies on the survey results from May-Chahal and others (72). The survey relied on participants to self-report the crimes for which they were serving sentences. This was drawn from a sample of prisoners from category C prisons. There are 4 categories of prisons: category A represents the highest level of security and category D the lowest. There is no representation from categories A, B and D. Aside from an over-representation of drug-related crimes, the crimes reported were broadly representative of crimes nationally.

Secondly, the analysis only focuses on the direct financial costs to government of imprisonment, and not the wider societal costs of crime. The direct costs of imprisonment are about £3.8 billion per year as of 2019 (75) (2020 to 2021 prices). This is a relatively small proportion of the total societal costs of crime, which are estimated to be £57 billion annually in England and Wales (25) (2020 to 2021 prices). The analysis does not attempt to estimate the wider societal costs associated with crime that is linked to problem gambling. This is outside the perspective of our analysis, with further details available in section 2.2.

There are issues calculating these wider societal costs for crime associated with problem gambling. This is mainly due to an issue of attribution as we cannot say with certainty that the surveyed prison population is representative of crimes committed, given that many will not

result in a prison sentence. So, the approach is conservative. It is reasonable to suggest that the societal costs would be significantly higher than the direct costs to government of imprisonment included in this analysis.

The authors of this report would echo the recommendation for further research in this area put forward by Wardle and others (8). We discussed with MOJ analysts the possibility of applying data science scraping techniques to court records to estimate the number of crimes in which gambling was a contributing factor. This would build upon our work, which (as above) relies heavily on extrapolating from the survey undertaken by May-Chahal and others (72). This was not taken forward for this report because primary analysis of databases was outside of the remit and scope of this analysis.

Although we support this as an area of further research, it is worth noting that this approach has an important limitation. Mentions of gambling in court records cannot necessarily attribute problem gambling as a causal factor, but only associations.

## 7. Discussion

For the 2023 update, we have updated the following section to present the updated results. We have added additional detail in places, but the discussion remains largely the same as the previous version of the report.

### 7.1 Estimated excess cost of harm associated with gambling

For England, the estimated annual excess direct financial cost to government associated with harmful gambling is equivalent to £412.9 million and the annual societal value of health impacts is equivalent to £635 to £1,355.5 million in 2021 to 2022 prices. We have provided a range for the wider societal costs given we have calculated a range for the estimated societal costs of excess deaths by suicide associated with gambling. We discuss this further in section 4.1.

This provides a combined estimate of approximately £1.05 to 1.77 billion, as shown in table 14. This is a conservative figure and an underestimate of the true size, because for some harms the analysis has only estimated costs of harm for people engaging in problem gambling (and not for at-risk gambling). Also, most harms have been costed only partially (such as financial, health, crime and work harms), while others have not been costed at all (such as relationships, cultural harms and the impacts on families).

**Table 14. Estimated excess cost of harm associated with gambling in England, by type of harm and type of cost**

Type of harm (or domain)	Sub-domain	Cohort	Government (or direct) costs (£ millions)	Wider societal (or intangible) costs (£ millions)	All costs (£ millions)
Financial	Statutory homelessness	Adults	£49.0	N/A	£49.0
Health	Deaths from suicide	Adults	N/A	£241.1-£961.7	£241.1-£961.7
Health	Depression	Adults	£114.2	£393.8	£508.0
Health	Alcohol dependence	Adults	£3.5	N/A	£3.5
Health	Illicit drug use	17 to 24 years	£1.8	N/A	£1.8
Total health harms	All health sub-domains	All health cohorts	£119.5	£635.0-£1,355.5	£754.4-£1,475.0
Employment and education	Unemployment benefits	Adults	£77.0	N/A	£77.0
Criminal activity	Imprisonment	Adults	£167.3	N/A	£167.3
Excess cost (£ millions)	All sub-domains	All cohorts	£412.9	£635.0-£1,355.5	£1,047.8-£1,768.4

Notes: Figures may not sum due to independent rounding. Where N/A is indicated, analysis was not undertaken.

Source: OHID analysis.

This analysis produces new cost figures associated with gambling in England. Our overall figures are significantly higher than those set out in Thorley and others, although costs to government are comparable. Thorley and others (1) estimated an excess cost to government in England between £200 million and £570 million per year (2015 to 2016 prices). There are several reasons that explain the differences between these estimates, not limited to the different price year (this analysis reports costs in 2021 to 2022 prices). These include:

- analysing people gambling at levels of elevated risk (low and moderate) and problem gambling
- updating the approaches for each harm where the use of more recent evidence permits
- most significantly, broadening the perspective to consider costs to wider society

We discuss the differences below.

## **At-risk and problem gambling**

The current analysis includes people gambling at levels of elevated risk (low and moderate) as well as problem gambling, whereas Thorley and others (1) concentrate solely on problem gambling. The analysis presented here estimates the excess cost for at risk-gamblers at £245 million (incorporating financial costs to government plus the societal value of loss to health and life), which is an associated harm that has not previously been costed. Wider costs to society are included here in addition to government costs, which are the focus of Thorley and others (1). Table 15 updates table 6 (see Methods) to illustrate the costs that we have estimated by type of harm and by type of gambler.

**Table 15. Excess cost of gambling-related harm in England by type of gambling population**

Type of harm	Sub-domain	At-risk gambling only (£ millions)	Problem gambling only (£ millions)	All at-risk and problem gambling (£ millions)
Financial	Statutory homelessness	£12.7	£36.3	£49.0
Health	Deaths from suicide	N/A	£241.1-£961.7	£241.1-£961.7
Health	Depression – healthcare costs	£51.6 (a)	£62.5	£114.2
Health	Depression – QoL impacts	£176.0 (a)	£217.8	£393.8
Health	Alcohol dependence	£3.2	£0.3	£3.5
Health	Illicit drug use	£1.5	£0.3	£1.8
Total health harms	All health sub-domains	£232.4	£522.1-£1,242.6	£754.4-£1,475.0
Employment and education	Unemployment benefits	N/A	£77.0	£77.0
Criminal activity	Imprisonment	N/A	£167.3	£167.3
Excess cost (£ millions)	All sub-domains	£245.0	£802.8-£1,523.3	£1,047.8-£1,768.4

Notes: Figures may not sum due to independent rounding. Where N/A is indicated, analysis was not undertaken. (a) For depression, only the excess cost for moderate-risk and problem gambling has been calculated. Given evidence limitations, it was not possible to estimate the impact on individuals engaging in low-risk gambling of changes to their depression risk.

Source: OHID analysis.



Table 15 shows that between 77% and 86% of the estimated excess costs relate to those experiencing problem gambling, despite representing only 10% of the total population of analysis (table 3, see Methods). This is because the analysis has not been able to cost the same types of harm for both at-risk and problem gambling populations. For example, evidence on suicides (which represents 23 to 54% of estimated excess costs), work and employment, and crime were only available for the problem gambling population. In turn, this translates into a higher average cost per problem gambler (£4,774 to £9,059) than an at-risk gambler (£154) in 2021 to 2022 prices. These average cost per gambler figures have been estimated using PGSI population estimates, which are presented in table 3.

These average cost figures are not entirely comparable because the costs included in each are not the same. They also include costs to both government and society. But we could expect that the more severe cases have a higher average cost than the less severe ones. However, people engaging in at-risk gambling represent 90% of the identified gambling population that might be experiencing some level of harm. So, this could imply higher total costs for this population. The current findings do not show these higher costs, and future research should continue to study people gambling at levels of elevated risk to cost the extent of their gambling-related harms.

## Using more recent evidence and costs to wider society

We based the health, crime and homelessness analyses presented here on different evidence and approaches to those reported by Thorley and others (1).

For the health harms associated with gambling, the analysis draws on the longitudinal studies identified in the [PHE abbreviated systematic review of harms associated with gambling](#). The expert panel we convened for this update suggested that we also use a meta-analysis of cross-sectional studies of depression, identified in a rapid literature review. In the case of estimating the associated cost of suicides, the analysis estimates the intangible costs only. So, the analysis presents a broader perspective to include costs to wider society, rather than a narrower perspective that considers government costs alone. The intangible cost to suicide (£241 to £961.7 million) represents 23% to 54% of the estimated £1.05 to £1.77 billion.

When we estimated the costs of excess cases of depression associated with gambling, we took a broader perspective. We have estimated both the costs to government and the costs to wider society. We estimated the healthcare costs of these excess cases, along with the societal value of the QoL impacts. We estimate that the cost to government of the increase in healthcare costs £114.2 million, and the intangible cost of the QoL impacts is £393.8 million.

The health analysis also includes at-risk gambling in the calculations where possible. For example, when costing depression (only moderate-risk gamblers), alcohol dependence and illicit drug use. The cost figure for health harms accounts for 72 to 83% of all estimated costs.

The analysis on criminal activity presented here and the analysis undertaken by Thorley and others have both used results from May-Chahal and others (72). This publication surveyed a sample of prisoners to measure problem gambling in UK prisons. This was to estimate the direct costs of imprisonment associated with problem gambling. Both the central estimates are based upon the conservative measure of problem gambling for which survey participants linked their current offence to gambling. However, the approach in this report differs in several ways, which explains why the estimated range is higher.

This analysis reports the lower and upper prevalence figures using May-Chahal and others' PGSI score for problem gambling to be consistent with other areas of the analysis. The analysis also calculates the excess prison population using prison population data without the use of odds ratios and without adjustments for sentencing, as the rationale for this approach in Thorley and others was somewhat unclear. The analysis also makes use of MOJ expenditure data in place of the GMCA unit cost database (75).

For homelessness, we present the costs for the population who receive statutory homeless support only and so do not consider people sleeping rough. Similarly to Thorley and others (1), the methodology to estimate costs draws on evidence by Sharman and others (30) to estimate the increased likelihood of gamblers needing statutory homeless support. It then adjusts this likelihood based on the latest evidence on the proportion of people who report at-risk and problem gambling before entering homeless services (31). Given Sharman and others only studied a small number of women, it has only been possible to estimate the impacts of gambling on homelessness for men (31).

For the employment estimates, we used a similar approach to Thorley and others (1), but this analysis updates the data inputs and unit cost figure.

This analysis is the second attempt to cost harms associated with problem gambling in England (together with Thorley and others), and the first analysing costs associated with at-risk gambling as well. There are signs that the evidence base in this field is growing. This is encouraging, because one of the main challenges encountered in the analysis here has been the lack of appropriate data and evidence.

## **7.2 Sensitivity analysis**

For this update, we have updated the following section to present the updated results. However, we have not changed the approach we took in sensitivity analysis.

We completed a sensitivity analysis on the domains of harm to address some of the main areas of uncertainty in the analysis. This comprises:

1. Changes to harmful gambling prevalence figures, which draws on the lower and upper 95% confidence interval.
2. Changes to the approach. For example, changing the unit cost to monetise the level of harm.

We present the results of the sensitivity analysis in table 16 to show the impact of changes in the main parameters.

## **Gambling prevalence figures**

Table 16 shows results using the lower and upper 95% confidence intervals for gambling prevalence, published by HSE (3). These replace the central gambling prevalence figure used in the analysis on all the domains of harm. We present those results throughout the report for each domain. We also present them collectively here to compare with the central cost estimate.

There are 3 domains of harm where we have conducted a sensitivity analysis on the approach, based on the central gambling prevalence figure.

## **Unit cost of alcohol dependence**

The sensitivity analysis assigns the global cost per alcohol dependent case, equivalent to £2,507 when uplifted to 2021 to 2022 prices, to the excess number of people participating in harmful gambling who we estimated to be alcohol dependent (20,658, see table 10). This replaces the unit cost for community alcohol treatment used to calculate the central estimate. The unit cost includes the direct, indirect and intangible cost of alcohol, such as alcohol-related healthcare, criminal activity and loss of productivity. So, it considers wider costs than what we used for our main analysis (see section 2.2 for details). We calculated this unit cost using the reported cost of alcohol-related harm, equivalent to £21 billion in 2012 (57) and the estimated number of regular alcohol-drinking adults in England equivalent to 10 million for 2014 (76). A regular drinking adult is defined as someone who drinks more than 14 units of alcohol per week. The figure is considerably higher in this sensitivity analysis, as it considers all alcohol harm in a top-down manner for all cases associated with harmful gambling, as opposed to a bottom-up calculation of treatment costs only for those in treatment in a given year.

## **Unit cost of illicit drug use**

The sensitivity analysis assigns the global cost per opiate and/or crack cocaine user, equivalent to £64,289 when uplifted to 2021 to 2022 prices (60), to the excess number of 17 to 24 year olds estimated to use illicit opiates and/or crack cocaine associated with harmful gambling (1,312, see table 11). This replaces the unit cost for community drug treatment used to calculate the central estimate. The unit cost comprises direct, indirect and intangible costs

relating to drug-related crime, health harm and wider societal impacts, such as lost productivity and the costs to significant others from drug misuse. It therefore considers costs more widely than the perspective used for this analysis (see section 2.2 for details). As with alcohol, the costs are significantly higher as the sensitivity analysis considers the cost of all impacts of drug use, for all cases associated with harmful gambling in a top-down manner, as opposed to a bottom-up calculation of treatment costs only for those in treatment in a given year.

## **Approach to quantifying gambling-related homelessness**

The sensitivity analysis draws on evidence from Sharman and others (30, 31) to calculate attribution rates, equivalent to:

- 6% for low-risk gamblers
- 2% for moderate-risk gamblers
- 9% for problem gamblers

Applying these to the total number of statutory homeless applications produces an estimate of the total number of applications directly attributable to gambling (21,930). We assigned a unit cost of £3,091 (2021 to 2022 prices) to calculate the excess cost of statutory homeless applications related to harmful gambling.

**Table 16. Sensitivity analysis showing the impact on estimated excess costs in England**

Type of harm	Sub-domain	Main analysis (central estimate) (£ millions)	Change to prevalence figures: lower 95% CI (£ millions)	Change to prevalence figures: higher 95% CI (£ millions)	Change to approach (a) (£ millions)
Financial	Statutory homelessness	£49.0	£33.8	£60.4	£67.8
Health	Deaths from suicide (c)	£241.1-£961.7	N/A	N/A	£241.1- £961.7 (b)
Health	Depression – healthcare costs	£114.2	£75.4	£154.6	£114.2 (b)
Health	Depression – QoL impacts	£393.8	£262.4	£526.2	£393.8 (b)
Health	Alcohol dependence	£3.5	£2.8	£4.2	£51.8
Health	Illicit drug use	£1.8	£1.4	£2.1	£84.3
Total health harms	All health sub-domains	£754.4-£1,475.0	N/A	N/A	£857.4- £1,578.1
Employment and education	Unemployment benefits	£77.0	£46.8	£107.3	£77.0 (b)
Criminal activity	Imprisonment	£167.3	£161.8	£341.2	£167.3 (b)
Excess cost (£ millions)	All sub-domains	£1,047.8-£1,768.4	N/A	N/A	£1,169.5- £1,890.2

Notes: Figures may not sum due to independent rounding. (a) Figures based on central gambling prevalence figure. (b) Figures have not been explored for these domains and instead refer to the calculated central cost estimates. (c) Given the suicide estimates have been calculated in a different way to other costs, and the central scenario presents a range, the upper and lower CI population estimates have not been provided under sensitivity analysis. These are marked N/A in the table. Given this, the totals cannot be calculated and are also marked as N/A. The central estimates for suicide calculate the total excess cost using these higher and lower population figures.

## 7.3 Limitations and recommendations for future research

Most of the limitations of this analysis are related to the availability of data for England, which shows the need for substantial research in this area. We explain the limitations of the analysis in turn. Given that a lack of available evidence means we've been unable to cost all the tangible and intangible costs associated with harmful gambling, our results should be considered underestimates of the true cost associated with harmful gambling.

The analysis we present here estimates costs associated with gambling and not costs caused by gambling. There is a lack of quantitative causal evidence for many of the harms described in conceptual papers such as Langham (20) and Wardle and others (8). The latter lists over 50 different metrics of gambling-related harms and it proposes a simplified model (the 'foundation model'), which the analysis has attempted to follow wherever possible. We explore this further in section 2.6. Future research in England should aim to expand the causal evidence base as much as possible on these harms.

Given the availability of data and evidence, it is not currently possible to cost some of the harms associated with gambling. In the case of tangible costs, greater emphasis should be given to research on financial harms that allows a comprehensive costing, when prioritising research needs in this area. This is because of the likely negative impact on the livelihoods of people engaging in harmful gambling, for which there is not much quality information that allows calculation of impacts by level of harmful gambling. This may include information about bankruptcies and the use of debt services.

There are also further government costs that we have not included in this analysis, due to a lack of suitable evidence. This includes costs such as the healthcare costs associated with suicidality, as well as other government costs associated with deaths by suicide like coroner's costs. We have considered the association between gambling and homeless applications for males but have not considered the costs of people rough sleeping due to harmful gambling. We also did not consider homeless applications associated with female gamblers because of the lack of suitable evidence.

In addition to this, there are a wide range of intangible costs that we did not consider in this analysis because of the lack of suitable evidence available. These cost estimates would allow us to provide a comprehensive estimate of the social cost of harmful gambling activities, rather than focusing only on the societal value of the associated health impacts, plus costs to government. These are impacts that have a cost to society, as well as to individuals (which are things that have no market, such as people's lives, emotional suffering, or time). We have calculated the government costs of crime associated with gambling, but have not calculated the indirect costs, including the impacts on the victims. Similarly, for the employment costs associated with harmful gambling, we only considered the impact on the cost of benefits. We also did not consider the wider societal impacts of the lost productivity resulting from

unemployment, nor the reduced productivity of people who remain in employment (for example through absenteeism, which is the lost productivity resulting from their missing work), which would replace estimates of the benefits costs in a societal analysis.

The main estimates of alcohol and drug dependence focus on the treatment costs of the cases associated with harmful gambling. We did not estimate the indirect costs of these dependencies, including the impacts on crime, wider healthcare costs and lost productivity. For these areas, we conducted sensitivity analysis to include some of these wider impacts, which significantly increased the estimated costs (see section 7.2 for more details).

Due to data limitations, the analysis of wider societal costs only estimates the social value of lives lost associated with problem gambling (through deaths by suicide) and the health impacts of excess depression cases. Future research should look to generate robust data on the causality of gambling and wider intangible costs so that they can be appropriately costed.

There is also a lack of suitable evidence to estimate the cost of the impacts on people's partners and families, as a result of them engaging in harmful gambling behaviours. Evidence of harms found in the PHE abbreviated systematic review of harms associated with gambling included emotional suffering and other negative effects on their mental health. It also found a negative impact on their quality of life and the distress of relationship breakdowns. These impacts could be a direct result of the gambling behaviours, or the associated outcomes including death by suicide, depression and involvement in crime. If a person's harmful gambling behaviours lead to financial hardship, this will also be felt by their families, including their children. This in turn may have impacts on these children's health and educational outcomes, and their future experience in the labour market. This could result in costs to both the government and wider society.

Good quality evidence is needed not only for people experiencing problem gambling but also for those gambling at levels of elevated risk (low and moderate risk), as they are also likely to suffer from substantial gambling-related harms (at an aggregate level). The cost estimates we present in this report include people engaging in low and moderate-risk gambling for some parts of the health and statutory homelessness analysis but not for all cost components, due to lack of data.

There are inherent difficulties in using international evidence to estimate costs in England. The analysis uses international evidence only in cases where there was consensus that it was robust. For example, we use Swedish evidence to cost deaths by suicide and Canadian evidence to cost alcohol dependence (36, 37). This highlights the caution that is needed when trying to extrapolate international evidence into a costing analysis, since there are differences in the gambling environment. For example, there are different regulatory rules, methods of gambling and gambling cultures (2).

The analysis does not include GambleAware and NHS England expenditure figures for gambling treatment services for the following reasons:

1. We do not have access to the spending in real terms by NHS England.
2. Expenditure figures might not reflect the real cost of provision.
3. To avoid potential double counting, because the analysis costs other harms associated with gambling, such as depression.
4. These expenditure figures will be an underestimate of the treatment cost given the limited access to these services.



## 8. Conclusions

For this update, we updated this section to present the updated results. Since the updated results are of a similar magnitude to the original analysis, we draw the same conclusions. We have made some small changes to the concluding points below, but the general points remain the same as the previous report.

The estimated excess cost to government and intangible costs to wider society (in terms of loss of health and life) associated with harmful gambling is a conservative figure for the total cost of gambling-related harm in England, using available but incomplete metrics. This is mainly due to data limitations and the scarce evidence base to identify the harms caused by gambling-related behaviour. More evidence is needed to quantify the true costs of gambling-related harm, both from an individual and from a wider societal perspective.

Putting the £0.41 billion central government cost estimate into perspective, the cost associated with harmful gambling is roughly equal to the amount local authorities spend annually on preventing and treating adult alcohol and drug misuse (£0.39 billion) and significantly larger than their annual spend on smoking and tobacco control (£0.08 billion). There are also the additional costs of £0.64 to £1.36 billion to wider society, through the loss of life by suicide and loss of quality of life due to depression.

Comparing the overall costs of other risk factors for health is not straightforward because of differences in methods, perspective taken, data and evidence available. However, these comparisons are still likely to be made, so it is important for us to be clear about what we have included in our estimates, to be transparent. Figures such as the cost to society of drug-related harm, estimated at £19.3 billion in 2017 to 2018 prices (60), or the annual cost of alcohol-related harm, estimated at £21 billion in 2012 (57), are often used to highlight the health and wider harms associated with these particular behaviours.

The difference between the estimated costs of gambling-related harms and the estimated costs of alcohol-related harms produced by the Cabinet Office in 2012 will be in part due to the types of costs included. The difference will also be due to the methodology used to cost each of the components, as well the total population affected by each of these types of cost (57). For the impacts on crime associated with harmful gambling, we only included some of the costs to the criminal justice system. For alcohol-related harms, in addition to the criminal justice system costs, the Cabinet Office analysis also included the cost of services for victims and other government related costs, as well as the cost to victims and costs in anticipation of crime. It also took a purely societal approach, whereas this analysis estimates costs to government and to the wider society. For example, we only included unemployment benefits as a cost in this analysis. These are not in the Cabinet Office alcohol analysis because this represents a transfer between parties in a societal perspective. The Cabinet Office analysis includes the

societal value of productivity impacts from alcohol, including the cost of absenteeism (missing work) and reduced employment, and loss of output due to death.

This difference in the scope of the analysis will be in part due to the availability of evidence in each of the areas. There is relatively limited data (in both breadth and quality) and evidence available for gambling compared to alcohol. For example, the Cabinet Office alcohol figures include the costs of healthcare problems that can be wholly or partially attributed to alcohol consumption, but this is not possible with gambling. The gambling healthcare analysis, and all the different types of analysis included in this report, are only able to estimate costs associated with gambling addiction. There is a pressing need for evidence to establish gambling-related attributable fractions for all types of harm to provide more robust estimates of costs caused by gambling activity.

Greater understanding of gambling-related harms and improving routine data collection will also help estimate the costs attached to those harms. Data could be collected through additional population-level surveys (such as the Understanding Society academic study) to capture insight from additional questions to those included in the Health Survey for England. For instance, this could be more detailed data on socio-economic variables, such as people's income and if they receive Universal Credit, as well as questions related to potential financial harms. Data could also be made available by the UK gambling operators, in the form of anonymised data of customer level activity.

[Gambling has been re-added to the forthcoming Adult Psychiatric Morbidity Survey](#), having been removed for 2014, which will provide improved data about the relationship between harmful gambling and mental health.

Although there is work underway to improve the system, the lack of treatment provision for harmful gambling currently available has probably meant less research in this area. One main issue is the shortage of high-quality evidence on the gambling treatment population in England. Gambling could draw on experience from the alcohol and drug misuse field. For example, the gambling treatment sector could create a national registry like the NDTMS. The Data Reporting Framework, initiated in 2015 and funded by GambleAware, appears to signal the start of this, but it is still in its infancy compared to the rich dataset offered by NDTMS.

At international level, a recent systematic literature review also highlights the lack of studies analysing the cost-effectiveness of public health interventions that target problematic gambling behaviour (80). Future evaluation of the effectiveness and cost-effectiveness of interventions is also needed to inform policy, both at an individual and population level.

## 9. Interests and acknowledgements

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### 9.2 Competing interests

The authors declare that they have no competing interests.

### 9.3 Funding

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#### 2023 update

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## Appendix A. Literature review methodology

We developed search terms for the harms associated with gambling review (which we published the protocol for on PROSPERO at [PROSPERO 2019 CRD42019154757](https://doi.org/10.1111/PROSPERO.2019154757)). We combined these terms with economic terms (such as ‘health economics’, ‘costs and cost analysis’, ‘direct costs’ and ‘health expenditures’) for the purpose of this study. We conducted the searches in Ovid MEDLINE and then translated them into a format to also search EBSCO Econ Lit.

In addition, we found grey literature online from websites, including:

- GambleAware InfoHub
- Gambling Commission
- GambLib (Gambling Research Library)
- GamCare
- National Problem Gambling Clinic
- Gordon Moody Association
- Gamblers Anonymous
- Open Grey
- Gam-Anon
- Gambling Information Resource Office Research Library
- Advisory Board for Safer Gambling
- Gambling Watch UK
- Australian Gambling Research Centre
- Gambling Research Exchange Ontario

An initial screening by the 4 reviewers identified irrelevant studies based on the titles and abstracts and excluded them. Reviewers were paired and independently screened 10% of each other’s screening to check for consistency of the included or excluded papers. Consistent with the gambling-related harms review, we considered inter-rater acceptability of 90% as sufficient, in line with guidance from the National Institute for Health and Care Excellence (82) on title and

abstract screening. If agreement was less than 90%, we investigated the reason and repeated screening. We brought disagreements to the Senior Economic Advisor and Head of Evidence Application for resolution.

Following a sifting of the literature, we assessed the 10 included papers for quality and applicability to the social and economic impact of gambling-related harms study. Data extract templates for cost-of-illness studies exist but these can be extensive and so resource intensive. Given resource constraints at the time of this review, we designed a data extract template to incorporate enough information for the reviewer to decide, and the reader to see, whether we should consider the results of a paper for use in the gambling-related harms study. We extracted relevant data into tables that were pilot tested before being used.

The quality appraisal stage grouped studies as:

1. High quality: assumptions clear and relevant, as well as apt statistical, economic techniques and sensitivity analyses used.
2. Medium quality: assumptions inferable, as well as apt statistical and economic techniques, and no sensitivity analysis.
3. Low quality: assumptions not clearly stated, as well as poor use or absence of statistical and economic techniques, and no sensitivity analysis.

To determine applicability, we grouped studies as:

1. Very high: studies based in England.
2. High: UK-wide, England and Wales or other devolved nations.
3. Medium: comparable countries (developed economies) or English local authorities.
4. Economies in transition, developing economies or federal states in developed economies.

We used the resulting papers to provide an overview of previous work on the cost of gambling-related harms, as well as a source of evidence for the economic analysis, as presented in the Introduction.

**Table 17. Example of data extract template**

<b>Authors (year):</b>	
<b>Title of paper:</b>	
Abstract	
Setting	
Study timeframe	
Problem gambling definition	
Type of gambling	
Population	
Summary of method	
Perspective	
Resource quantification method	
Data sources	
Health	
Social care	
Productivity	
Crime	
Intangible	
Other costs	
Statistical techniques	
Stated and justified assumptions	
Sensitivity analysis	
Results	
Strengths	
Limitations	
Industry involvement	
Applicability rating	
Quality rating	
Relevance	

## Appendix B. Cost of gambling framework

In 2017, Browne and others developed the cost of gambling framework to assess the social costs associated with gambling in financial terms in Victoria, Australia. The cost categories include gambling-related harm associated with:

- financial impacts
- emotional and psychological costs
- relationship and family impacts
- crime
- productivity loss and work impacts
- costs to the Victorian state and local governments

You can find a summary of the cost framework by cost category, subcategory and who bears the cost in table 3 (page 38) in the research report '[The social cost of gambling to Victoria](#)'.



## Appendix C. Data sources of harms and costs on gambling

Table 18 outlines the main sources of evidence used to estimate the cost of harm associated with gambling.

**Table 18. Data sources of harms and costs on gambling in England**

Domain	Sub-domain	Sources of evidence
Health	Deaths from suicide	Age-specific English prevalence numbers for problem gamblers (PGSI 8+ criteria) and individuals with gambling disorder (DSM IV – 5+ criteria) (92).
Health	Deaths from suicide	Age-specific suicide rate per 100,000 population for England (42).
Health	Deaths from suicide	Standardised-mortality ratio for deaths by suicide (Swedish population) (36).
Health	Deaths from suicide	Average age of death from suicide (42).
Health	Deaths from suicide	Years of Life Lost - estimated using ONS National Life Tables (44).
Health	Deaths from suicide	The societal value of a quality adjusted life year (QALY) ( <a href="#">HMT Green Book</a> ).
Health	Deaths from suicide	The proportion of a statistical life year in full health (89).
Health	Depression	Age-specific English prevalence numbers by type of problem gambler (3).
Health	Depression	Prevalence rate for depression (All 18+ years) (50).
Health	Depression	Odds ratio for gambling impact on depression (84)
Health	Depression	Annual cost per case for an individual with depression (51).
Health	Depression	The societal value of a quality adjusted life year (QALY) ( <a href="#">HMT Green Book</a> ).

Domain	Sub-domain	Sources of evidence
Health	Illicit drug use	Age-specific English prevalence numbers by type of problem gambler (3).
Health	Illicit drug use	Prevalence rate per 1,000 population for opiate and/or crack cocaine use for England, 2016-2017 (latest data available) (58).
Health	Illicit drug use	Odds ratio for gambling impact on hard drug use (38).
Health	Illicit drug use	% OCU prevalence in substance misuse treatment (58).
Health	Illicit drug use	Annual cost per case for an individual in drug misuse treatment for opiates and/or crack cocaine use (56).
Health	Alcohol dependence	Age-specific English prevalence numbers by type of problem gambler (3).
Health	Alcohol dependence	Prevalence rate per 100 population for alcohol dependence use for England, 2018-2019 (53).
Health	Alcohol dependence	Odds ratio for moderate/severe alcohol dependence (37).
Health	Alcohol dependence	% alcohol dependence prevalence in substance misuse treatment (54).
Health	Alcohol dependence	Annual cost per case for an individual in alcohol treatment (PHE analysis (54 to 56)).
Work and employment	Unemployment benefits	Probability of a problem gambler claiming unemployment benefits compared to a non-problem gambler (1).
Work and employment	Unemployment benefits	Alternative Claims Count (ACC) from the Stat-Xplore data portal run by the Department of Work and Pensions (DWP) - Table 3 Benefit Group (68).
Work and employment	Unemployment benefits	Median length of an unemployment spell is taken from the Official Labour Market Statistics NOMIS database (69).
Work and employment	Unemployment benefits	Working age population (16 to 64 years) in England (70).
Work and employment	Unemployment benefits	Unit Cost Database produced by <a href="#">the Greater Manchester Combined Authority (GMCA) Research Team</a> . The government/fiscal annual cost of an individual being unemployed was estimated to be £13,139 in 2019-20 (26).

Domain	Sub-domain	Sources of evidence
Crime and antisocial behaviour	Imprisonment costs	Prison population data in the UK. Source (74,75).
Crime and antisocial behaviour	Imprisonment costs	Adult population (16 to 74 years) in England. Source: (70)
Crime and antisocial behaviour	Imprisonment costs	Survey data used to estimate the proportion of prisoners who are defined as experiencing problem gambling, and those who link their current offences to gambling (72).
Crime and antisocial behaviour	Imprisonment costs	Unit costs per prisoner on an annual basis is £41,136 in 2019. Source: The Ministry of Justice HM Prison and Probation Service (MOJ, 2019) (25, 75).
Financial harms	Statutory homelessness	Age-specific English prevalence numbers by type of problem gambler (3).
Financial harms	Statutory homelessness	% people in statutory homeless services who gamble (30, 31).
Financial harms	Statutory homelessness	% people in statutory homeless services who report experiencing gambling before becoming homeless (30, 31).
Financial harms	Statutory homelessness	Number of successful statutory homeless applications (32).
Financial harms	Statutory homelessness	Annual cost per statutory homeless application (costs include one-off homeless applications and ongoing costs, which include the cost of a court desk scheme; an application decision; 4 weeks in temporary accommodation and administration costs of a new letting) (26).

## Appendix D. Further details of the methodology

This annex provides additional data and figures used in the analysis presented in this report, to supplement the detail given in the main body of the report.

### Population of analysis

Table 19 presents the proportion of gamblers for each age and sex category using central PGSI estimates. Table 20 presents the total population in each age and sex category from ONS mid-year population estimates. These figures were used to scale the age and sex breakdown from the combined multi-year HSE dataset to the HSE 2018 estimates for total numbers in each gambling category. The result – and the figures used in our analysis – are presented in table 4, in section 2 above.

Table 21 and table 22 present the age and sex breakdowns of the upper and lower population estimates for each gambling risk group using PGSI. This is the result of the scaling described above, and so equivalent to table 4 for the 95% CI bounds of the HSE numbers.

Table 23 presents the age and sex breakdowns of the central, upper and lower population estimates for individuals with a DSM-IV score 5 or more (pathological gambling). Again, this is the result of the scaling described above, for the DSM-IV 5 or more populations.

**Table 19. Proportion of gamblers in England by each age and sex category (%); HSE 2012, 2015, 2016 and 2018 (central estimate)**

**Males**

<b>Age</b>	<b>Non problem gambler/non gambler (%)</b>	<b>Low-risk gambler (%)</b>	<b>Moderate-risk gambler (%)</b>	<b>Problem gambler (%)</b>
16-19	90.1	8.5	1.1	0.2
20-24	83.9	10.0	3.5	2.6
25-29	86.5	9.3	3.2	1.1
30-34	90.5	5.8	1.9	1.8
35-39	92.8	4.5	2.1	0.7
40-44	94.4	3.0	2.2	0.3
45-49	94.4	3.0	1.3	1.3
50-54	95.3	2.9	1.4	0.4
55-59	95.7	2.3	1.3	0.7
60-64	96.8	2.2	0.8	0.2
65-69	97.9	1.3	0.3	0.4
70-74	97.7	1.4	0.6	0.3

**Females**

<b>Age</b>	<b>Non problem gambler/non gambler (%)</b>	<b>Low-risk gambler (%)</b>	<b>Moderate-risk gambler (%)</b>	<b>Problem gambler (%)</b>
16-19	97.9	1.9	0.1	0.0
20-24	95.9	2.0	1.9	0.3
25-29	96.8	2.3	0.7	0.2
30-34	97.6	1.7	0.7	0.1
35-39	97.7	1.7	0.5	0.1
40-44	98.4	0.9	0.5	0.2
45-49	98.4	1.2	0.2	0.3
50- 54	97.8	1.6	0.6	0.0
55-59	98.2	1.3	0.3	0.2
60-64	99.0	0.9	0.0	0.1
65-69	99.1	0.8	0.1	0.0
70-74	99.4	0.6	0.0	0.0

**Table 20. Total population in England by each age and sex category in England, ONS 2018 mid-year population estimates**

Age	Males	Females
16-19	1,279,926	1,212,903
20-24	1,805,668	1,706,986
25-29	1,935,980	1,879,944
30-34	1,889,726	1,897,871
35-39	1,845,854	1,871,629
40-44	1,686,506	1,704,078
45-49	1,879,694	1,919,548
50-54	1,931,434	1,984,017
55-59	1,763,370	1,809,959
60-64	1,493,186	1,551,188
65-69	1,366,142	1,456,451
70-74	1,304,718	1,420,082

**Table 21. PGSI population in England by age and sex used in the model: lower bound estimates based on 95% confidence interval**

Result of scaling breakdown by age and sex from HSE 2012, 2015, 2016 and 2018 combined dataset, to total numbers from HSE 2018.

**Males**

Age	Low-risk	Moderate-risk	Problem gamblers	Total
16-19	92,925	6,701	561	100,187
20-24	160,261	42,574	28,564	231,399
25-29	161,454	41,860	10,477	213,792
30-34	94,830	23,469	20,162	138,462
35-39	69,605	25,039	5,524	100,168
40-44	40,580	24,610	2,085	67,274
45-49	44,321	15,416	13,661	73,398
50-54	43,983	16,636	3,155	63,774
55-59	30,613	13,146	6,296	50,055
60-64	24,298	6,546	870	31,714
65-69	12,740	1,813	2,636	17,189
70-74	11,768	3,619	1,275	16,661
Total	787,378	221,429	95,265	1,104,073

## Females

Age	Low-risk	Moderate-risk	Problem gamblers	Total
16-19	15,001	231	0	15,232
20-24	23,622	20,164	1,428	45,214
25-29	32,654	7,055	917	40,626
30-34	23,485	6,700	287	30,473
35-39	24,268	3,970	333	28,570
40-44	9,492	4,391	865	14,748
45-49	15,604	967	1,722	18,293
50-54	23,496	6,017	0	29,513
55-59	15,760	1,981	1,041	18,783
60-64	9,214	0	326	9,540
65-69	6,519	335	0	6,854
70-74	3,824	0	0	3,824
Total	202,939	51,811	6,920	261,669

## Males and females

Low-risk	Moderate-risk	Problem gamblers	Total
990,317	273,240	102,185	1,365,742

**Table 22. PGSI population in England by age and sex used in the model: upper bound estimates based on 95% confidence interval**

Result of scaling breakdown by age and sex from HSE 2012, 2015, 2016 and 2018 combined dataset, to total numbers from HSE 2018.

## Males

Age	Low-risk	Moderate-risk	Problem gamblers	Total
16-19	120,190	19,401	7,690	147,280
20-24	191,570	59,394	40,500	291,465
25-29	187,690	56,201	21,883	265,774
30-34	119,045	35,935	28,659	183,639
35-39	92,947	36,493	13,884	143,325
40-44	60,935	34,467	8,635	104,037
45-49	65,903	26,320	21,451	113,673
50-54	65,227	27,353	10,344	102,924
55-59	50,371	23,464	13,820	87,656
60-64	40,447	14,650	5,713	60,810
65-69	25,000	7,384	7,482	39,866
70-74	26,712	11,537	6,787	45,035
Total	1,046,037	352,599	186,850	1,585,486

## Females

Age	Low-risk	Moderate-risk	Problem gamblers	Total
16-19	34,628	6,720	0	41,348
20-24	45,063	32,195	8,480	85,737
25-29	52,583	16,755	6,678	76,016
30-34	40,226	15,168	4,580	59,974
35-39	40,604	11,558	4,575	56,736
40-44	22,193	11,611	5,431	39,235
45-49	30,355	6,720	7,039	44,114
50-54	40,130	14,302	0	54,432
55-59	31,459	8,960	6,283	46,701
60-64	21,596	0	4,198	25,794
65-69	17,419	4,657	0	22,076
70-74	15,051	0	0	15,051
Total	391,305	128,646	47,263	567,214

## Males and females

Low-risk	Moderate-risk	Problem gamblers	Total
1,437,342	481,245	234,113	2,152,700

**Table 23. DSM IV score 5 or more population in England by age and sex used in the model**

Result of scaling breakdown by age and sex from HSE 2012, 2015, 2016 and 2018 combined dataset, to total numbers from HSE 2018.

## Males

Age	Lower estimate (95% CI)	Central estimate	Upper estimate (95% CI)
16-19	0	3,453	10,540
20-24	25,962	29,399	34,842
25-29	2,313	6,684	14,289
30-34	17,229	19,382	23,334
35-39	4,938	6,030	10,738
40-44	2,068	4,756	9,665
45-49	10,854	14,096	18,354
50-54	600	3,925	9,336
55-59	838	3,053	7,964
60-64	3,417	5,000	8,643
65-69	2,706	3,425	6,255
70-74	787	1,778	5,857
Total	71,713	100,983	159,818



**Females**

<b>Age</b>	<b>Lower estimate (95% CI)</b>	<b>Central estimate</b>	<b>Upper estimate (95% CI)</b>
16-19	0	0	0
20-24	538	5,303	11,737
25-29	0	1,156	6,025
30-34	996	1,866	5,752
35-39	694	2,531	6,609
40-44	346	1,316	4,902
45-49	611	2,422	6,405
50-54	0	0	0
55-59	1,593	4,010	8,341
60-64	0	0	0
65-69	0	0	0
70-74	563	1,597	5,602
<b>Total</b>	<b>5,341</b>	<b>20,201</b>	<b>55,374</b>

**Males and females**

<b>Lower estimate (95% CI)</b>	<b>Central estimate</b>	<b>Upper estimate (95% CI)</b>
77,054	121,184	215,192

## Suicide analysis

Table 24 below provided the estimate suicide rate for the general population by age and sex after deaths of undetermined intent were removed (42).

**Table 24. Estimated suicide rate in England by age and sex, 2019**

### Males

Age band	Suicide rate non-gamblers
16-19	6
20-24	10.3
25-29	13.1
30-34	13.9
35-39	14.9
40-44	17.5
45-49	18.1
50-54	19.6
55-59	16.4
60-64	15.6
65-69	9.3
70-74	10.7

### Females

Age band	Suicide rate non-gamblers
16-19	3.1
20-24	3.7
25-29	5
30-34	4.1
35-39	4.8
40-44	5
45-49	5.5
50-54	6.1
55-59	4.8
60-64	4
65-69	3.4
70-74	3.5

## Homelessness analysis

Table 25 details the figures used to calculate the relative risk of homelessness for individuals with differing levels of gambling risk, compared to the general population. These calculations use the percentage of males accessing homeless services who are gamblers (30), the percentage experiencing gambling harm before accessing homelessness services (31), and the gambling prevalence rate from HSE 2018.

**Table 25. Figures used to estimate the relative risk of homelessness for different gambling risk populations in England**

Figure label	Description of figure	Low-risk	Moderate-risk	Problem gamblers
A	Percentage accessing homelessness services who are gamblers (male)	14.2%	5.6%	20.8%
B	Percentage experiencing gambling harm before accessing homelessness services	61.5%	61.5%	82.4%
C	Percentage homelessness services associated with gambling, before homeless (calculated) (A*B)	8.7%	3.4%	17.1%
D	Percentage of gamblers in the non-homeless population (male)	4.3%	1.5%	0.6%
E	Percentage of non-gamblers in group accessing homeless services (calculated) (1-C)	91.3%	96.6%	82.9%
F	Percentage of non-gamblers in the non-homeless population (male) (calculated) (1-D)	95.7%	98.5%	99.4%
G	Relative risk (calculated) $((C/(C+E))/(D/(D+F)))$	2.13	2.38	27.35

## Employment harms analysis

Table 26 details the unemployment stocks and on-flows from the Alternative Claims Count (ACC) database (68) for the 2019 to 2020 financial year. These figures are used in the employment harms analysis to calculate the estimated number of people claiming employment-related benefits over this period. The 3 categories reported in the ACC (Jobseeker's Allowance, Universal Credit and Additional) are added together to give the total estimate of people claiming unemployment-related benefits (2,896,988).

**Table 26. The stock of ACCs in England in April 2019**

These figures add together the categories 'Jobseeker's Allowance', 'Universal Credit Searching for Work' and 'Additional', and the subsequent on-flows from May 2019 to March 2020.

Measure	Date	JSA	Universal Credit	Additional
Stock	Apr-19	191,303	583,209	305,078
On-flows	May-19	3,237	128,629	14,455
On-flows	Jun-19	5,502	127,439	12,672
On-flows	Jul-19	7,135	138,434	14,582
On-flows	Aug-19	5,641	140,897	14,767
On-flows	Sep-19	6,347	134,445	15,291
On-flows	Oct-19	6,735	153,973	15,327
On-flows	Nov-19	8,757	137,552	10,136
On-flows	Dec-19	7,073	157,666	10,658
On-flows	Jan-20	5,317	151,684	10,749
On-flows	Feb-20	7,881	161,098	9,611
On-flows	Mar-20	8,006	175,630	10,072
Totals	Apr-19 to Mar-20	262,934	2,190,656	443,398

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