



Measuring Gambling-Related Harms: Methodologies & Data Scoping Study

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Note: This scoping study was commissioned and funded by the Gambling Commission to assist the delivery of the National Strategy to Reduce Gambling Harms, published in April 2019. The study builds on 'Measuring gambling-related harms: A framework for action' by outlining appropriate methodologies and approaches for estimating costs which could be taken in the UK, or have been used in other jurisdictions.

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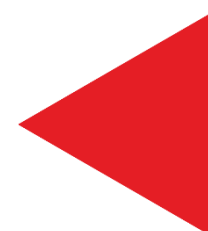


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1 Summary

This report examines what is known about different approaches to measuring the social costs of gambling-related harms, as well as providing practical and pragmatic recommendations on how to strengthen the evidence base to assess economic impact. It draws on three different sets of information: a rapid mapping/ scoping review of the literature, supplemented by expert interviews and an expert online survey.

The review found 322 records looking at different aspects of ways to measure and cost harms linked to gambling and other addictions. This included 112 records dealing specifically with gambling. The review highlights the growth in studies that adopt a more public health perspective approach to costing harms, including consideration of impacts for all gamblers and their families rather than problem gamblers alone. Quality of life and wellbeing instruments are also now being used to measure the impacts of gambling related harms.

The report ends by setting out a series of recommendations on the scope of costing studies, as well recommending more investment in longitudinal studies that specifically look at issues of causality. Simulation modelling methods that are widely used in public health economics could also be used to look at both the costs of gambling-harms and the cost effectiveness of measures to tackle these harms.

2 Background

Gambling includes a variety of activities. This not only includes betting on various activities such as sport events, but also playing games of chance for a prize and participation in lotteries, such as raffles and sweepstakes (1). In the latest survey on annual gambling behaviours in Great Britain in 2018, excluding play on National Lottery tickets only, 32% of survey respondents aged 16+ indicated that they had participated in any form of gambling in the previous four weeks (2). An earlier analysis combined 2016 survey data from the Health Survey for England (HSE), the Scottish Health Survey (SHeS) and the Wales Omnibus (3). In this analysis 0.7% of respondents were identified as being problem gamblers, 1.1% presented as moderate-risk gamblers (those who experience a moderate level of problems leading to some negative consequences) with up to a further 2.4% classified as low- risk (those who experience a low level of problems with few or no identified negative consequences) (2, 3).

Although these survey data may suggest that most people participate in gambling without experiencing substantive harms, potentially the full costs to society of gambling-related harm are still substantial, although not all of these costs are easy to measure in monetary terms. The recent paper 'Measuring gambling-related harms: a framework for action' produced for the Gambling Commission (4) considered how gambling-related harms may be better understood, measured and monitored and explored whether it is possible to make an estimate of some of the social costs of gambling-related harms.

Gambling-related harms outlined in this framework not only include personal impacts faced by individuals who have experienced problems due to gambling, but also adverse impacts on their family and friends. At an individual level the many different potential aspects of harm can include declining health, the breakdown of family relationships, social ostracism and the consequences of unmanageable debt. There are also potential resource consequences for both publicly funded and private sector services linked to gambling related harm, for instance increased demands on health, welfare, security and criminal justice services. Gambling may also lead to a net

reduction in economic productivity due to reduced participation in employment by people directly affected by gambling as well as by their family members. They may also reduce participation in voluntary activities or cutback on higher/continuing education. There are also potentially more difficult to quantify impacts such as a decline in trust and cohesiveness in local communities.

The framework also noted that “*sustained action to prevent gambling-related harms should include actions taken at the societal level, to change broader environments; the community level, to address local influences; the familial or peer level, to address interpersonal impact, as well as at the level of the individual*”. A wide range of metrics on gambling related harms that could be used to measure the impacts of sustained actions were also identified, some of which could potentially be quantified monetarily and used to build up a more comprehensive estimate of the costs of gambling-related harms.

This synthesis report builds on the approach set out in this framework. It summarises the strengths and weakness of different approaches to quantifying the social costs of gambling-related harms identified in the framework, as well as providing practical and pragmatic recommendations on how to strengthen the evidence base to assess economic impact.

The report is accompanied by a separate toolkit which provides guidance on techniques to quantify and place value on the many different consequences of gambling-related harms and includes case studies to illustrate different approaches that can be used. This should also be helpful when considering the economic case for evidence-based interventions to reduce gambling related harms.

3 Methods

Our aim in this synthesis report is to document approaches that have been or could be used to better measure and value the cost of gambling-related harms identified in *Measuring gambling-related harms: a framework for action* (4). This synthesis report draws on three different sets of information: a rapid mapping/ scoping review of the literature supplemented by expert interviews and an expert online survey.

3.1 Review objectives and methods

A rapid scoping review has been undertaken to

- i) Identify examples of and approaches to measuring the costs of gambling-related harms
- ii) Identify examples of and approaches to measuring the costs of comparable addiction-related harms
- iii) Identify examples of and approaches to measuring the costs of public-health related harms
- iv) Identify examples of economic evaluations or return on investment studies on interventions to prevent or reduce gambling-related harms (or related public health /addiction harms)
- v) Identify other relevant information on gambling and addiction related harms

Search strategies were constructed for a range of databases covering economics, health, psychology, social science, criminal justice: Econlit, Medline, Psychinfo, CINAHL, Soc Index, HMIC, Criminal Justice Abstracts and Google Scholar. Detailed search strategies for each database searched are available in Appendix 1. There were no language restrictions although all search terms were in English only. There were no restrictions on dates other than for Google Scholar, where to keep the search manageable within the timescale, only materials published between 2009 and 2019 were included. Titles and abstracts of papers retrieved from bibliographic databases

were screened. Google Scholar results were also screened on the basis of full texts where available. Additional hand searches of some journals, e.g. the Journal of Gambling Studies, were also conducted.

As well as summarising our findings and mapping out the different approaches that have been used to assess costs, and the frequency with which they have been used, we have triangulated information from literature, with interviews, the online survey and our own experience to set out the strengths and weaknesses of different approaches and to develop a set of recommendations.

3.2 Interviews and survey

Concurrently an interview / online survey guide was developed iteratively with input from the Gambling Commission, for which ethical clearance at the LSE was obtained. Interviewees and survey respondents also received information on the purpose of the study stating how we would handle their responses, e.g. keeping these unattributed, and how recorded/stored, as well as obtaining their informed consent. Public health researchers, economists, experts on addiction and gambling-related harms, as well as health policy experts in the UK and around the world were invited to participate in (predominantly) Skype and telephone based interviews. Academics and experts from Norway, Canada, Denmark, Ireland, Spain, Sweden and Finland, Australia, New Zealand, Hong Kong, Singapore and the USA were interviewed or responded to the survey (see Appendix 4)

The interview consisted of a number of specific questions and prompts for further information as appropriate. The primary purpose of each interview was to capture insights on what are the key issues that should be incorporated when measuring gambling related harms from a societal perspective, rather than discussing the wider economic benefits/costs of gambling for which there is already an extensive literature. Prompts were used to tailor questions depending on the specific respondent e.g. for those from a public health economics background we sometimes explored challenges faced when measuring harms around other public health issues, or had additional questions looking at implications of measurement from a policy perspective.

An online pared down version of the survey was developed using Qualtrics – an online survey tool used by the LSE which is compliant with GDPR and Data Protection Requirements. This survey was distributed to public health, mental health and economics UK academic list members. Both interviews and the survey also provided opportunities to explore costing methodologies used in other areas of public health, including injury prevention and all addiction-related harm reduction measures.

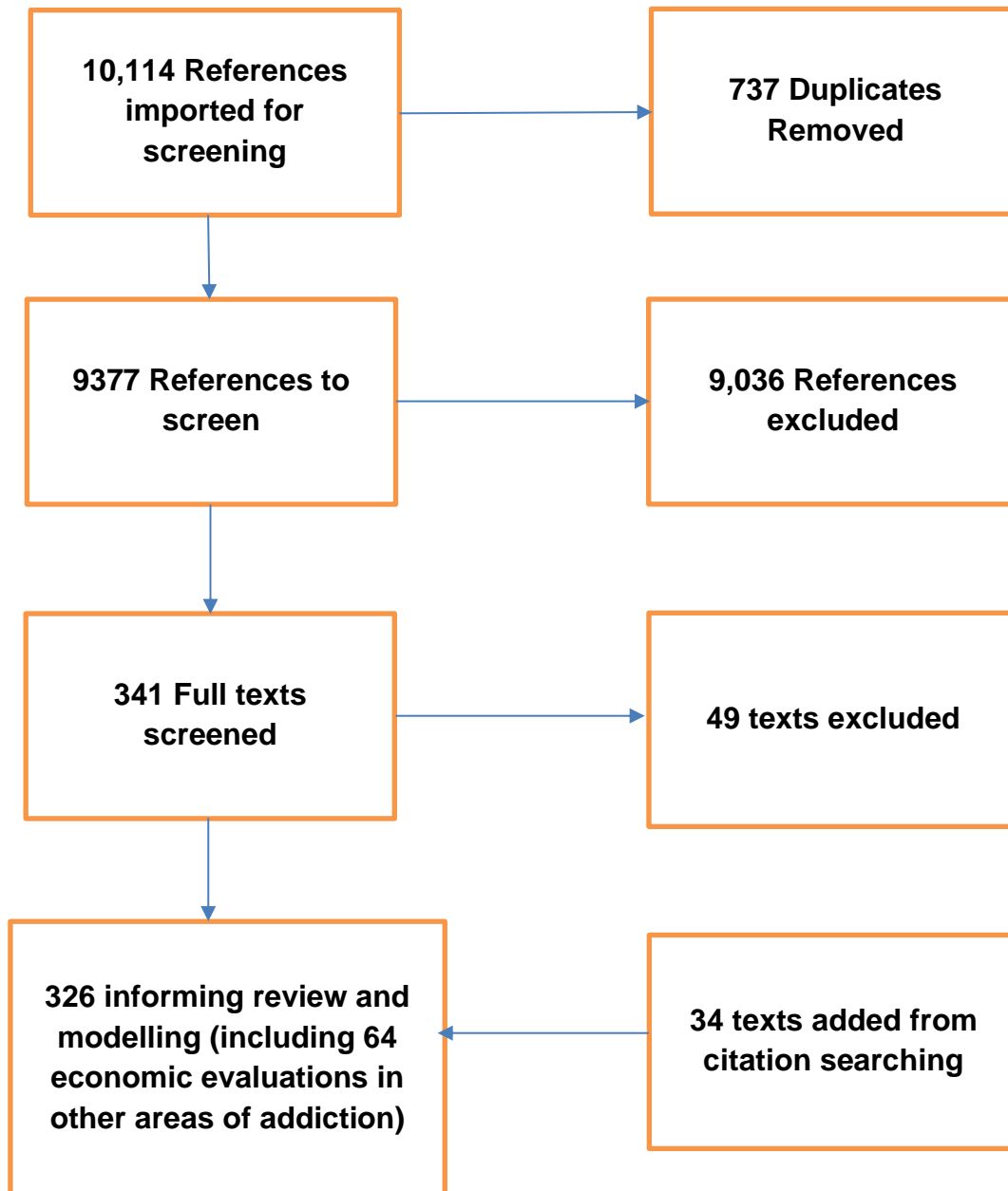
4 Mapping Review

4.1 Review results

Figure 1 provides a PRISMA¹ flow chart indicating the results of the review. Over 10,000 records were imported for screening from the different databases, leaving 9,377 records after duplicate records were removed. 341 records met initial inclusion criteria based on title/abstract screening. 49 texts were excluded and 34 added from citations in included papers. This left 326 records looking at different aspects of ways to measure and cost harms. This included 64 economic evaluations and 115 records deal specifically with gambling. The remainder deal with different behaviours that can cause harm: alcohol 97, substance abuse 41, tobacco 20 and 14 on other issues, including compulsivity and general mental health issues. Appendix 2 provides information on studies that have been identified.

¹ Preferred Reporting Items for Systematic Reviews and Meta-Analyses

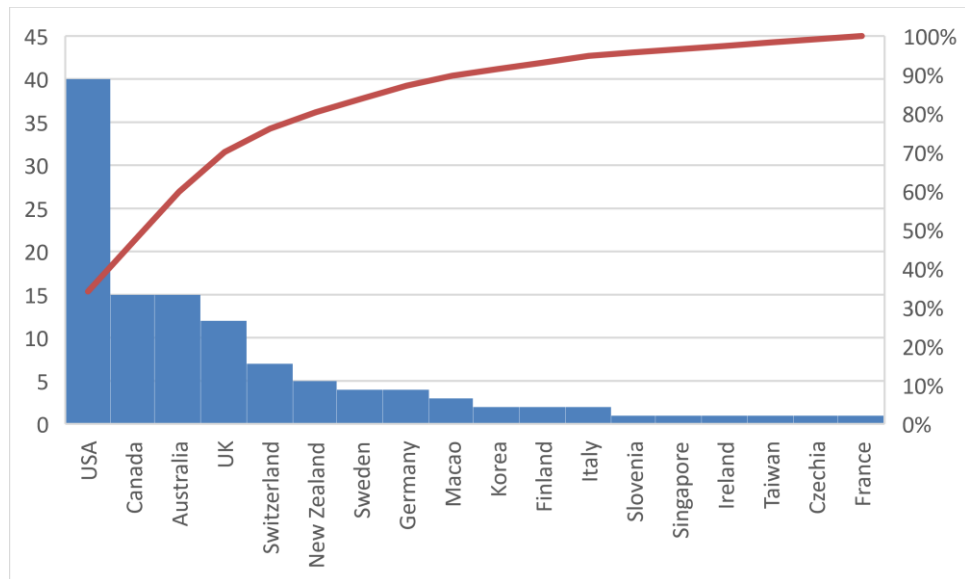
4.2 Figure 1: PRISMA Search Flow Chart



There is an extensive literature, heavily linked to casino development, which has focused largely on the impacts of gambling in terms of overall economic growth, the creation of jobs, additional tax revenues and other consumer benefits such as reduced costs of some leisure activities due to competition and other supports related to gambling (5). Whilst these are important aspects of the economics of gambling, they are beyond the scope of this review. The review's terms of reference specifically focused attention on capturing data to ensure a better understanding of methods for and estimates of the economic impacts of gambling-related harms

The review indicates that literature on measuring and valuing the costs of gambling related harms continues to grow, although almost no studies were found before the mid-1990s. Some of these early studies did focus on some of the social costs associated with problem gambling (6), including a very early cost benefit analysis of a treatment programme for gamblers (7). Often, they did not include impacts on health services, perhaps because many studies were in the US where health care financing was dominated by employer-provided and other private health insurance. Historically much of this literature was related to the various consequences, including social consequences, of casino development in Canada and the United States. Two thirds of studies have been published in the last 10 years and over time the literature has broadened to cover a wider number of countries and different types of gambling experience, including online gambling and the related area of gaming that allows the purchase of in-game items. Figure 2 indicates countries of primary authors of papers, with substantive work seen not only in North America but also in Australia. The red line on cumulative total share of studies indicates that almost 40% of all studies were led by authors from the United States, followed by Australia, Canada and the UK.

4.3 Figure 2: Countries covered in studies on costs of gambling-related harms



5 Interview / survey results

Here we briefly summarise some of the main perspectives and key themes coming out of 12 interviews (lasting between 30 minutes and 1 hour duration), as well as 59 other survey responses by experts in gambling, public health and mental health. These themes are also reinforced in the synthesis of findings in Section 5.

Most interviewees were from an academic background, but a minority were also involved in implementing public health policy at either national or local level in England or other countries. Overall 76% of interviewees and /or survey respondents were from the UK. The remaining respondents came from the following countries: Australia, Canada, Chile, Denmark, Finland, France, Germany, Hong Kong, India, Ireland, New Zealand, Norway, Serbia, South Korea, Sweden and the United States. We asked participants to indicate their area(s) of research and/or professional background. 52% indicated a background in health economics and 10% general economics. 10% had a background in gambling research and 5% in general addiction, compared with 33% who indicated a background in public health and/or health promotion.

5.1 Perspectives on gambling related harms

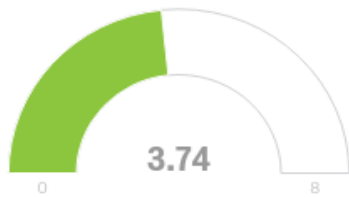
We asked interviewees and survey respondents for their views on the relative contribution of eight broad categories of harms contained in the Framework for Action on Gambling Related Harms (4) to the overall costs of gambling related harms. 61% of survey respondents and interviewees indicated that harms related to money and debts were likely to account for the single most important share of harms to capture when measuring costs, with 20% suggesting this would be for mental health impacts and 19% on the impacts on partners, families and relationships. Physical health was ranked as potentially representing the lowest share of overall costs by 46% of respondents, followed by community impacts 24% and crime 12%. Assigning the categories a ranking score between 8 (for the highest) and 1 (for the lowest), as shown in Figure 3, produces a mean priority score of 6.00 for measuring impacts on money and debt, followed by partners, families and relationships with a score of 5.06 and

mental health with a score of 4.89. Some interviewees felt that there was an overlap between the concepts of psychological distress and poor mental health.

Figure 3

Mean ranking of contributors to costs of gambling-related harms (higher values represent perceived greater share of costs)

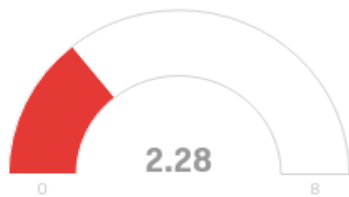
Work and employment (e.g. unstable employment, job loss, reduced performance)



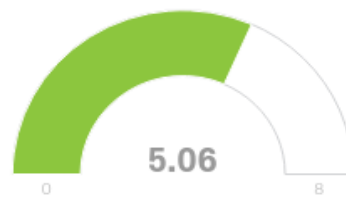
Money and debt (e.g. financial insecurity, reduced disposable income, unmanageable debt)



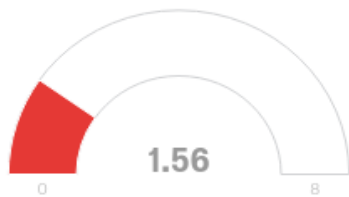
Crime (e.g. anti-social behaviour, other crimes)



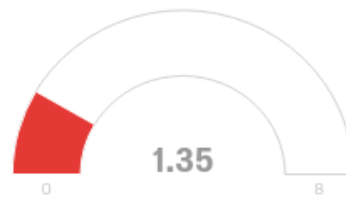
Partners, Families and Relationships (e.g. ruptured, neglected or exploited relationships)



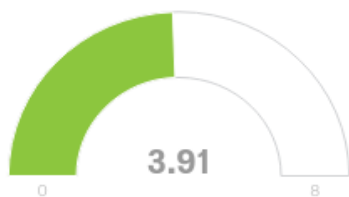
Community (e.g. reduced community cohesion, social isolation, increased inequalities)



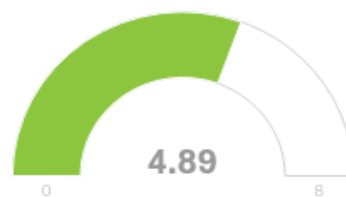
Physical Health



Psychological Distress



Mental Health (e.g. increased anxiety or self-harm, reduction of mental wellbeing)



Money and debt have great implications for gamblers and may in turn trigger many of the other harms over time, and this was a theme of many interviews. As one interviewee put it:

“the precursor to everything is the over-involvement in gambling – they are spending too much time or money gambling...there is clearly some bad decision making around money management”.

Another interviewee who had previous experience working with Citizen’s Advice spoke of seeing numerous people with financial debt problems due to gambling. The interviewee emphasised that it was the consequences of being in debt rather than the monetary value of the debt itself that was of most importance, stating that the marginal utility of income should be assessed when looking at gambling debts. A comparatively small financial loss for individuals may have a much greater disutility to them if their incomes are very low; equally, the organisations (e.g. the gambling industry) to which funds may be transferred gain a much lower level of marginal utility from these transfers.

Interviewees also emphasised the importance of measuring the impacts on families. For instance, one interviewee felt that these impacts on families were just as important as money and debt problems but were often overlooked when measuring gambling-related harms. These impacts could be wide ranging and included factors such as anxiety and fear: partners could be very worried about *the potential, as well as actual*, consequences of gambling.

The impacts on the mental health and wellbeing of children were of particular importance to some respondents, and felt to be overlooked. Indeed, in the Framework for Action, it was also recognised that some aspects of the framework would need adaptation. Subsequently a specific framework for action for children and young people has now been published (8). Comments from interviewees and survey respondents are in line with the themes seen in that new framework. Respondents noted that there can be many problems in families, not only due to a lack of money, but also because the psychological distress from problems between partners further impacts on their children. Interviewees also suggested there was much to be learnt

from existing research on the impacts on families not just from gambling, but also from the wider study of how children are affected when one or more of their parents experiences mental health problems. Some felt that there were potentially strong adverse impacts on the mental health and the mental wellbeing of children, as well as on their performance in school.

In discussion around work, respondents also noted the importance (where feasible) of collecting information on absenteeism from work, as well as lost employment, although acknowledging that official sick leave records were not likely to list gambling as the reason for absence. Perhaps more controversially, one respondent felt that in the same way that presenteeism costs (poor performance while at work) tend to outweigh absenteeism costs for some mental health issues, there may be costs to workplaces resulting from lost productivity while at work. This will occur if individuals spend some of their working time on gambling activities rather than the work that they are supposed to be doing.

The Gambling Commission's regular tracker of gambling participation includes a survey of online gambling behaviour. In 2018 12% of online gamblers had gambled at work over the previous four weeks (2), while this is useful it would be helpful to know whether this was during work breaks rather than during working time. In this survey 96% of online gamblers also indicated that they had gambled at home over the previous four weeks. Given the increasing trend in home (and other mobile) working it might also be useful to know more about whether gambling is having an impact on home-working time, as well as on other household productive activities such as family care responsibilities. All of these presenteeism costs will be compounded by any presenteeism due to poor mental or physical health arising as a consequence of gambling.

There was some difficulty in thinking about the importance of impacts on the community given that the term 'community' can cover many different issues. Some respondents felt that perceptions of safety were most important, especially where there were many different gambling establishments grouped together. Town centres might also look unattractive if they have too many betting shops; local politicians and council officials might also worry about how this might chime with any local authority

initiatives to promote more 'healthy high-streets'. One interviewee also felt strongly that the impacts of gambling on widening inequalities in society needed to be explicitly measured, given the assumption that gambling most affects those who can least afford to gamble.

Criminal activity was only ranked 6th overall, even though one interviewee commented that around 50% of pathological gamblers commit crimes to finance their gambling activities. This might have been because there was a perception that crime is only associated with rare, albeit catastrophic gambling habits. Physical health was generally not a high priority but this was clearly influenced by the challenges in attributing physical health impacts to gambling. In contrast, one of our interviewees who does have access to large scale health insurance claims data, including a diagnosis of pathological gambling, rated physical health as the second-most important area to cover after money issues. This was because of the greater degree of confidence in the links between stress induced physical health problems and gambling and ability to link this to health service utilisation. As one interviewee noted:

"From what problem gamblers tell me, when they start stressing about money then they start having stress related problems such as lack of sleep, they start drinking too much, they start becoming very anxious because they do not know how they will pay their bills....I've had so many problem gamblers tell me that they have ulcers or thrombosis, or it really affected their hearts ...it really exacerbates the stress they have around managing money"

Overall the framework was felt to capture important aspects of harm well. Looking at factors that were important but not as visible in the framework as they might be, the main comments again focused on the impacts on children. Identification of the need for local authority social care services to intervene, for instance related to safeguarding issues for families was felt to be important. One interviewee felt that the reason that impacts on children had been overlooked in costing studies was because they mainly fell on different sectors than that for adults: child and adolescent welfare services and the education sector. Such costs, the interviewee argued, tended to be dismissed in analyses of the costs of gambling even though gambling-harms lead to strong distrust in children of their parents, as well as

hardship and poverty, including, in extreme circumstances the loss of the family home.

Other missing harms that were mentioned included looking at co-morbid dependencies including alcohol and online pornography, violence to others, as well as the impacts of the stigma, discrimination and alienation associated with gambling. Suicidal ideation might also independently (of suicide) be mentioned as a harm associated with gambling.

5.2 Perspectives on the measurement of harms

Our survey also asked respondents to rank in terms of ease of measurement nine promising metrics on harms set out in the Framework for Action on Gambling Related Harms (4). For the easiest to measure metrics: 29% of survey respondents and interviewees felt that job loss / benefit claim data was easiest to measure, 27% believed it to be bankruptcy information and 23% felt it was the increased use of statistics on the use of debt advice / management services. For the most difficult to measure metrics: mental health issues were felt by 21% of respondents to be most difficult to measure; interviewees noted that while mental health data were readily available, attributing a share of this to gambling was difficult. Other aspects of harm that were felt to be most difficult to measure were use of relationship services (20%) and requests for public support to address homelessness (19%).

Figure 4 provides mean ratings of ease of measurement of these nine metrics, with 9 being the highest possible ranking and 1 the lowest. Mean rating scores were relatively low, in part reflecting less confidence in ease of measurement of many metrics. Only four of the nine measure had a mean rating score around 4 or more: Bankruptcy 5.67, job losses/benefit claims 5.59, increased use of debt advice / management services 4.86 and suicide / suicide attempts 3.98.

The challenge of establishing causality

Respondents suggested that it was important to do more to measure health and other service utilisation by gamblers. However, interviewees in general recognised that the

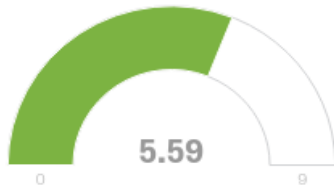
challenge was not so much in obtaining data related to these metrics, but rather the extent to which some of these metrics could be a consequence of gambling related behaviours. For instance, interviewees acknowledged that obtaining suicide rate data over time at a fairly small area level may be relatively easy to obtain and also that suicide may be a very important consequence of gambling-related debt. Yet, they noted it can be difficult to attribute suicides (and self-harm) to gambling. In the UK and other countries to do this involves looking at coroner and police reports, but these may not be sufficient to identify the impacts of gambling, even making use of detailed automated textual analyses. In many instances coroner and police records will not go back far enough into the history of the deceased to identify any link. If coroners are not aware of any association between gambling and suicide they may not ask the right questions to explore whether this is a factor that should be recorded. It may also be the case that where debt, tenancy evictions and home repossessions are a result of unmanageable debts, this might be partly due to gambling related debts. It would also be helpful to flag up any association between gambling and these types of impacts of debt in coronial reporting.

GambleAware supported a recent expert workshop held in London to explore ways in which to strengthen what is known about gambling and suicidal behaviours (9). Recommendations included development of longitudinal datasets on gambling behaviours that also include information on suicidal ideation and behaviours, more focus in psychological autopsy studies on gambling, as well as greater collaboration with banks and similar organisations in a number of different ways. These include analysis of customer repeat-expenditure patterns, using unique merchant IDs, and retrospective analysis of bad/written off debts of deceased customers.

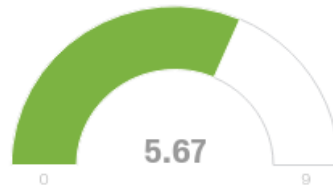
Figure 4

Mean ranking of ease of measurement of potential indicators of harm (higher values indicate more ease in measurement)

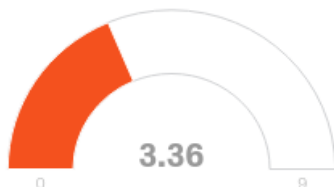
Job losses / increased claims on benefit systems



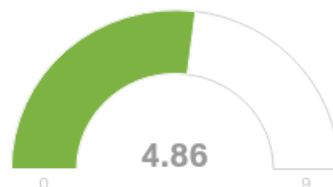
Bankruptcy and similar legal measures



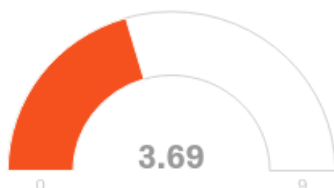
Request for public support due to homelessness



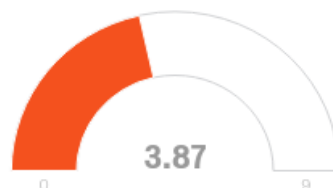
Increased use of debt advice / management services



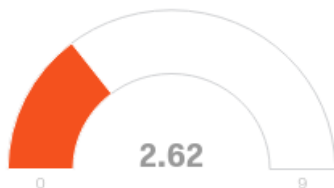
Crimes committed



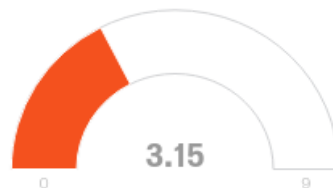
Divorce, separation, relationship breakdown



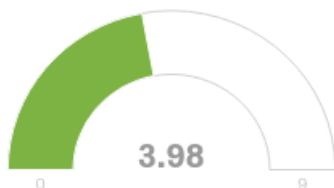
Increased use of relationship services, e.g relationship counsellors



Stress, depression, anxiety, self-harm, substance abuse, other mental/physical health issues



Number of suicides and suicide attempts



5.3 Meeting challenges in measurement

The general observation was that the problem is not measurement of metrics *per se* but rather to attribute some share of these metrics to gambling. Respondents felt that many existing routine datasets are of limited value, because they do not include gambling flags, and even if they do many datasets are cross sectional so causality cannot easily be established.

In some Scandinavian countries, e.g. Finland, all of the metrics listed in the framework can be found, but again it was felt that there was insufficient information to know if these were a consequence of gambling. For instance, in registry data on suicide in Finland gambling was very unlikely to be listed as a causal factor for suicide. This could only be determined through examination of detailed case files. Moreover, underlying causes for impacts such as depression would not be available in registry data. One interviewee also felt that in the early stages of problem gambling individuals are not necessarily very self-aware of their situation and that it may not be picked up in screens and surveys.

5.3.1 The need for longitudinal studies

There was a general view that longitudinal studies are needed; a view that is also consistent with the Gambling Commission's ongoing research programme which includes work to explore the most effective way of collecting longitudinal data on individuals' gambling behaviours and gambling-related harms (10). This should include specific studies related to gambling and general population studies that include gambling metrics. Interview respondents felt that the impacts of gambling can build up over many years so that problematic gambling can start in adolescence and the consequences of debt may last even for a lifetime. Several individuals wanted data to be collected on 'gambling careers' and long term effects of income, employment and relationship shocks. This would allow questions to be answered such as: identifying factors in the initial pathway to gambling that might indicate higher longer term risk of gambling problems or determining how quickly people

bounce back from gambling shocks, e.g. whether this takes a year, ten years or even a lifetime.

There was a recognition that establishing new longitudinal studies may be expensive and difficult, although examples, as in Sweden, New Zealand, Australia and the US were noted (11-14). Adding questions to existing longitudinal population studies would be more feasible. Respondents also suggested studies might need to run for ten years or more to maximise usefulness. This would be in line with long-term cohort studies on alcohol and drug harms:

“Studies need to have a duration of at least 12 months as the shortest time frame, but there should also be much longer time frames, because the development into a gambling addiction may take place over several years. The financial problems and the psychological problems develop over several years. New longitudinal studies are also needed to estimate changes in costs over time, as both economic and psychological problems can accumulate over time. Difficult to say re timeframe but maybe 10 years.”

Another respondent similarly said:

“I would say you have to look for at least five years, perhaps ten years, to identify all the consequences, to look at all the costs, to look at all the services that have to be offered...people may have to move to new locations, find a new job, all of that”

In designing such longitudinal studies another challenge is *“that everyone is ten years older at the end of the study – so there is not a good understanding of what is happening for younger people”*. This interviewee suggested that the participants in such longitudinal studies would need to be refreshed every few years to deal with this issue. This would not just be through replacements for natural attrition but also by actively replacing some participants after a few years in the cohort.

Respondents also felt that it would be good to have access to data in longitudinal studies from services that individuals with gambling-related harms are likely to come into contact with, such as debt advice agencies or relationship counsellors. For instance, a respondent in the UK indicated that the GamCare charity collects

information on the use of its services, while in Germany some data on gambling histories are collected by debt advice services. However, to do this in a meaningful way, there is a need to try and standardise data related to gambling behaviours that are collected by these agencies, so that this can potentially be of use in future analyses. (The GamCare website notes that its data ‘are not collected, nor do they have integrity as a dataset, for academic purposes’ (15). One respondent also commented that “*there are international codes for gambling in the ICD10 hospital episodes statistics database although in my experience they are rarely used*” but others pointed to the potential to make use of health insurance datasets to analyse costs of problematic gamblers. For instance, data on the help-seeking behaviour and use of services to treat people with gambling are collected in one German region - Bavaria.

Longitudinal datasets could also cover family units rather than just individuals. This would make it easier to look at the impacts on the children (and other family members) due to a parent gambling. It may be possible to identify impacts on their education, employment and other life trajectories. In Norway, for example, it is possible to link datasets on income and tax receipts to individual educational attainment related datasets; these datasets may also indicate if there are welfare concerns in a family due to parental gambling. Longitudinal studies may also be able to look at issues on the “normalisation” of gambling and how the proliferation of gambling websites, as well as online gaming, may contribute to this. Very long-term studies might also look at intergenerational impacts. If parents gamble then perhaps there may also be an increased risk of intergenerational transmission of gambling harms.

It may also be possible to make use of existing longitudinal cohort studies that indirectly have information of interest. One respondent commented that given that

“previous British Household Panel Surveys [and current English Longitudinal Surveys of Ageing – ELSA] included questions on winning from the pools, lottery and some other form of gambling, perhaps some assumption could be made about frequency of participation needed to obtain a win and then link with later mental health outcomes, for instance to match up ELSA data on gambling wins with later MH outcomes, even though this was for only for older population”

5.3.2 Other approaches

Although the Gambling Commission is exploring how best to undertake future longitudinal studies, more can still be done with cross-sectional datasets, including asking questions to determine whether adverse life experiences such as poor mental health or financial debt are a precursor to or consequence of gambling. One respondent stated:

“To address the issues of attribution and causality we need to have more epidemiological studies with gamblers asking, for example, how often they have problems at home or ask about whether any divorce has been related to their gambling. Survey information on gamblers is needed, with more information on the socio-economic characteristics of gamblers”.

For instance, the Problem and Pathological Gambling Measure (PPGM) (16) was highlighted as an instrument that was designed specifically to allow direct attribution, e.g. between bankruptcy and gambling, and is being used in studies in Canada, Finland and US.

Suggestions on cross-sectional datasets that may be useful to look at in the UK included the Adult Psychiatric Morbidity Survey, Tracker and other survey data collected by the Gambling Commission, other data from the Health Survey for England and Scottish Health Survey, as well as the Scottish Crime and Justice Survey. In Great Britain, respondents also noted that an adapted version of the DSM-IV screening tool used for cross-sectional gambling prevalence surveys contains one question on whether individuals engage in criminal activities and another on whether gambling has had an impact on relationships, job or educational opportunities. More might be made of the responses to these individual questions, alongside individual gambling risk scores, to estimate attribution more accurately in economic analyses.

Several respondents mentioned statistical techniques that might be used to approximate causality. These might include scope to use instrumental variables regressions to identify the true correlation between gambling and mental health when mental health is also influenced by other variables, e.g. unemployment. It

would also mean looking for factors that are correlated with gambling but not (in this case) with mental health outcomes.

Respondents also noted the need to look for opportunities for natural experiments and interrupted time series studies. Changes in the regulations around gambling, for instance related to fixed odds betting terminals, might present such an opportunity. Such studies would have to account for new, substitutional products that may be introduced by the industry to compensate for enforced changes in gambling behaviours.

5.4 The role of quality of life and wellbeing

90% of respondents agreed with the statement that “More focus should be placed on better measurement of impacts on quality of life associated with problematic gambling.” Interviewees also spoke of the potential importance of measuring the quality of life not just of gamblers but also of their families, and noted that the value of quality of life could be monetised but cautioned that any estimate of costs would have to be careful to avoid double counting, e.g. quality of life may be reduced because of the magnitude of debt. They also recommended that wider measures of wellbeing might also be collected alongside quality of life data.

One respondent was sceptical as to whether the domains of the EuroQOL - EQ-5D, the most commonly used quality of life instrument in the UK, would allow the impacts of gambling to be picked up (as only one of these domains related to mental health and the other four are concerned with basic aspects of physical health).

“Thinking about what the domains of the EQ-5D are, I just can’t imagine it is going to be picking it [impacts of gambling on quality of life]up”

In the UK it was also noted that some exploratory work on wellbeing had already been conducted. In the 2010 British Gambling Prevalence Survey respondents had been asked to rate their level of happiness on a scale from 1 to 10 and it had been possible to monetise differences in levels of wellbeing between problematic gamblers and others (17). The Warwick Edinburgh Mental-Wellbeing Scale is included as standard

in the Health Survey for England and Scottish Health Survey. Wellbeing responses have been analysed alongside gambling behaviours (3). This type of analysis might be extended to take account of the adverse impacts (from the gambler's perspective) on relationships with family members. It would also be helpful to directly measure impacts on the wellbeing of families relative to levels of gambling within family units.

The advantage of both quality of life and wellbeing approaches is that they may lead to large estimate of costs which may resonate with policy makers. However, it may not be possible to breakdown these costs, meaning that it may be more difficult to use this information to calculate potential costs attributable, and therefore potentially avoidable to different sectors, through tackling gambling. In presenting results on costs related to gambling it would be helpful to compare impacts on wellbeing and/or quality of life with other public health issues that have an impact on wellbeing, e.g. alcohol and drug-related harms. Not all of the quality of life or wellbeing change will be due to gambling, they will be correlated with other factors as well. Interviewees agreed that appropriate quality of life or wellbeing instruments could be embedded into longitudinal cohort surveys, potentially allowing the issue of attribution to be addressed.

5.5 Other comments

Survey data collection challenges

Other themes that emerged from interviews and survey responses concerned the target population of interest and the importance of evaluation. Although beyond the scope of this report, the ways in which survey data are collected were noted to have a bearing on the ability to make estimates of the costs of harms. One interviewee felt that all data were difficult to measure because the absolute number of serious problem gamblers in Great Britain is very small, noting that

“It’s difficult because you have to find the people – it is more akin to alcohol dependency (which also has very small numbers) rather than problem drinking. These individuals are hard to target in surveys basically. While attributable fractions exist for

alcohol because they have been worked out by others, this would need to be done for gambling.”

Equally in looking at gambling prevalence in the US, another interviewee said that it was not sufficient to rely on a large scale (10,000) general population survey, as even with a relatively high rate of problem gambling there were not enough people in that survey who would score as problematic or pathological gamblers to have statistically confidence in any attributions. Data from an online opt-in panel survey of the general population were also used, as in a US context, the advantage of online panel data is that there is likely to be a higher rate of mental health issues among online panel members, including a higher rate of problem gamblers than in a standard population survey.

From a public health economics perspective respondents also agreed that surveys should look beyond impacts on the estimated 0.5% to 0.7% of the GB population who may be problem gamblers. They felt there is a need to look at impacts on individuals who may currently be experiencing low or moderate levels of harm, and arguably even broader to look at gambling harms across the entire population.

As one respondent put it: *“there is a distinction between rarer and more catastrophic harms such as loss of house versus more common but less severe harms. From a classic ‘Geoffrey Rose’ perspective on public health – the total social costs of gambling may be mainly in the general population rather than in more extreme gamblers. These are people who gamble small amounts often may experience most of the social costs”*

Another added that *“The bulk of the harm is not attributable to those with the most severe clinical condition”*

Being overly concerned about causality

Another issue that came up was whether it was worth trying to improve what we know about causality and attribution. In contrast to most respondents, one clinical expert who was interviewed actually felt that in respect of the association between

gambling and mental health problems, the issue of causality may be less of a problem that commentators suggest:

“We know from other addictions e.g. alcohol or drugs, the dependency usually precedes the mental disorder – you become dependent and then you get the depression – that’s the typical pathway. So it is more likely that the addiction comes first. It would be feasible to look at experience from other impulse control disorders and apply them to gambling. Neuro-biologically it is the same thing mechanism as these other disorders, it has been measured that gambling increases the wellbeing hormones, the dopamine, in the brain.”

Measuring impacts across sectors

Respondents also emphasised the importance from a public health perspective of looking at impacts across sectors, including impacts on family members. Different actors in different sectors potentially can play a role in responding to gambling-related harms and much can be learnt from experience with alcohol-harm. It was argued that estimates of the social costs of harmful alcohol use recognise and provide information on costs to different sectors and go on to look at the cost effectiveness of actions to reduce alcohol-harms from different sector perspectives.

Need for economic evaluations of actions to tackle gambling-harms

Several respondents emphasised the greater importance of evaluating the cost effectiveness of interventions to address gambling, e.g.:

“It is more interesting to know what is effective and cost effective in tackling gambling than in understanding the causality; also more important to understand whether if we restrict one type of gambling then is there a move to a different type of gambling.”

Economic evaluations can look at many different actions including work to restrict access, as well as anti-normalisation of gambling measures, and rules on advertising. It may also be important to focus on alternative rewards for people to reduce gambling and other addictions – improving the environment around gambling may not work if the wider environment continues to deteriorate. There can also be use of economic techniques, combined with behavioural psychology that may be used to influence choices around whether or not to gamble.

6 Synthesis of findings

6.1 Overview and theoretical background

The focus on quantifying the costs of gambling-related harms is relatively recent, with relatively little literature produced until the 1990s. A constant theme that is seen throughout previous discussions of this literature is the lack of consensus on approaches to follow; the limited focus on the costs of gambling-related harms from a public health economics perspective at first glance may be surprising, given the apparent similarities with alcohol-related harms, an issue that has been extensively covered in the health economics literature. The limited focus on impacts other than health, as well as on wider macro-economic impacts, both positive and negative of gambling, may explain why the focus on a public health economics approach to gambling-related harms was initially relatively muted. Moreover, unlike the situation for many other addictive behaviours, such as for harmful alcohol use, few of the policy levers for protection against gambling-related harms have been the responsibility of the health sector. It is also perhaps the reason why the economic debate was initially led by economists mainly working outside of the health domain, with relatively little emphasis placed on health-related outcomes.

In essence, much of the past debate on the economic impacts of gambling has focused on comparing the overall economic benefits of gambling against some of its adverse consequences. Without delving into detailed economic theory in this report, it is important to recognise that there are different perspectives on economics. Many economists working outside of social welfare and health may adopt what is known as a 'welfarist' approach to economics. This essentially means that societal welfare is made up collectively of individuals making their own choices that in theory best meet their own personal preferences (maximising their utilities) about what they do in life. In the context of gambling, or indeed other potentially addictive activities such as alcohol consumption, this would also imply that the vast majority of individuals who engage in gambling are generally deemed to be acting rationally, fully comprehending what they

are doing and will desist from gambling at the point where harms outweigh the benefits that they enjoy.

This would mean that the market for gambling might operate as any other private market, with many of the costs of gambling such as debt seen simply as a transfer of revenues between different individuals. In the same way gambling related crimes would be an (admittedly undesirable) transfer of assets between different individuals in society and thus do not need to be considered in analysis of gambling harms. They may also argue that the loss of health is again a private matter rather than something that policy makers should be interested in, unless the public purse picks up costs associated with treatments for this loss of health.

Much of total consumer expenditure on gambling from this perspective is assumed to be an expression of economic benefit (known as consumer surplus). These economic benefits are also argued by welfarists to be relatively easy to measure (18); in contrast the costs of gambling-related harms are portrayed as being nebulous and difficult to measure and only affecting a minority of gamblers rather than the vast majority of gamblers who benefit from participation in gambling, just as they would in other leisure activities (19).

This welfarist approach is however just one perspective on economics. Many individuals working in health, education and other areas of public policy will not fully share or endorse this perspective. This is certainly the case in public health where individuals are often assumed not to be fully informed to make genuinely optimal decisions on protecting and promoting their health, or engaging in healthy lifestyles. This, for instance, can be because of a lack of insights, poor understanding of future risks to health, unequal access to information, as well as physical or mental health problems.

One alternative theoretical perspective that is used can loosely be considered as extra-welfarism (20). It goes beyond measurement of individual utilities, for instance to consider other factors such as inequalities in the distribution of outcomes and impacts on all affected and not just the individual. The perspective adopted by extra-welfarists does not have to be the traditional societal perspective which excludes

private costs and redistributions of funds and resources. Instead the perspective might be that of decision makers of interest, which in the case of gambling might be different government departments that are ultimately responsible for regulating gambling, as well as dealing with any adverse consequences of gambling. It could also mean looking at the costs of gambling from the perspective of individuals and their families. Outcomes and indeed costs can also be weighted to reflect different ethical considerations and value judgements in society; factors such as equity in need for services and supports, as well as equity in outcomes can be considered. Metrics other than monetary impacts, such as quality of life and wellbeing, intrinsically are of value and could be prioritised in decision making.

Of the estimates of the costs of gambling related harms we have identified, more appear to be adopting something akin to an extra-welfarist perspective. They provide more detailed breakdowns of costs associated with gambling-harm across different sectors and consider impacts beyond the individual. They increasingly include estimates of costs that have traditionally been difficult to quantify and measure, e.g. costs of divorce and family breakdown associated with gambling.

Methods used to more robustly estimate the impact of gambling related harms are drawing on approaches to measuring impact that have been used in disciplines such as environmental, health and criminal justice related economics, where decisions of individuals have not been assumed to always be fully rational. These areas have long been subject to analysis of both the benefits and harms associated with tackling poor health, preventing crime or protecting the environment.

As will be indicated later in this section, much can be learnt from what has been written on the economic costs of different addictive disorders and public health problems, including legal and illegal substance abuse, alcohol-related harms and smoking. For instance, guidance on how to estimate the social costs of these issues was published by the World Health Organization almost twenty years ago (21). This recommended the inclusion of four types of cost: health care costs associated with treatment of addictive behaviours, productivity costs linked to premature mortality and reduced participation in work or non-work activities (e.g. household tasks or volunteering), law enforcement and criminal justice related costs, as well as costs related to research,

education, prevention, loss of property and personal injury, and social welfare system costs. Many of these costs would not be included by welfare economists. Some estimates of cost go further still and estimate additional costs, such as costs to family members, and factors that are not easily to value such as pain, discrimination and social exclusion. Issues of attribution of costs to addictive behaviours have also been considered.

The behavioural economics literature also is supportive, highlighting many different factors, such as the way in which information is presented and framed that mean that individuals often make decisions that are not rational from an economic perspective (22). There is also a large literature beyond the scope of this report demonstrating the difficulties many gamblers have in understanding the average expected financial return on their gambles and how this may differ across different types of gamble. There are also specific types of activity that can be looked at when considering how best to measure the social costs of gambling harm, including an enormous and long standing literature on the costs of alcohol and substance abuse related-harm (23). In the subsequent parts of section 6 we highlight some of the developments identified from the literature, interviews and survey, look at the role of quality of life and wellbeing, and identify approaches that have been used for other addictive behaviours.

6.2 Examples of recent estimates of costs of gambling-related harms

Our synthesis has identified examples of different aspects of the costs of gambling-harms from different countries. Here we describe the approaches used in some of these studies. A companion piece to this report provides detailed information methods and concepts on costing, again linking to these and other examples. In section 6.2 where necessary we do briefly describe some concepts and approaches alongside the illustrative examples of how the literature is developing. In describing studies we also highlight the year the study was conducted or year of publication where not clear. All costs have been standardised in purchasing power parity adjusted to 2018 British

Pounds using the CCEMG-EPPI Centre Cost Converter (last updated April 2019)². We also report costs in their original currency and price year.

Table 1 indicates which of the broad categories of gambling-related harm in 'Measuring gambling-related harms: a framework for action' (4) have been included in selected estimates of costs. Nearly all of these studies estimate the costs of impacts on mental health while none appear to capture wider impacts of harms on the community. Table 2 in the Annex provides more detailed information on these studies, indicating that nearly all adopt what is known as a prevalence-based costing approach, which seeks to quantify costs for all individuals identified with a health problem, in this case problematic gambling in a defined time period (usually a year or less). The main alternative to this approach, known as incidence-based costing, follows individuals newly identified with a health problem typically over a longer time-period, even a lifetime, to estimate their costs. While this is the preferred approach leading to more accurate estimates of costs, it requires access to individual level longitudinal data on the impacts of gambling and so has not featured in the analyses we have identified.

Australia: Productivity Commission approach

A number of studies have been undertaken in Australia, with work from the Commonwealth Government's Productivity Commission being well cited. They represent a good starting point when thinking about the costs of gambling-related harms as they have also influenced studies elsewhere, including examples we will describe from the Czech Republic and the UK. The Commission has twice estimated the impact and costs of gambling-related harms for problem gamblers (24, 25). For their first estimate of costs in 1999 they commissioned a national survey of more than 10,000 Australians to identify gambling behaviours and impacts of harms; in addition two other surveys were also conducted, one for 400 problem gamblers making use of counselling services, and another survey of counselling service providers. This first costing analysis covered a relatively broad range of impacts, treating some financial and criminal justice impacts as having societal rather than simply personal impacts. These included bankruptcy and lost employment. It also placed a monetary value for

² <https://epi.ioe.ac.uk/costconversion/>

(severe problem only) gamblers and their families/friends on the emotional distress caused by gambling, including impacts on family relationships, as well as depression and suicidal behaviour. The monetary value placed on these costs was based on published compensation payment schedules for emotional harm used in Australia. The Productivity Commission did not however include any actual costs related to physical or mental health, nor the actual costs of suicidal events. Nor did it pick up on wider impacts to local communities related to gambling.

Overall the Commission estimated that the social costs of gambling-related harms were between £1.53 and £4.76 billion (\$A1.8 billion and \$A 5.6 billion 1997 prices) per annum and using similar methodology these costs were £2.7 and £4.83 billion (\$A4.7 billion and \$A8.4 billion 2008 prices) per annum in the second analysis in 2010. Between 42% and 52% of these costs were attributed to emotional distress experienced by parents and families. Other studies in Australia in 2008 and 2009 have also made use of the same methodology at individual state level (26, 27).

There are further examples of studies that have built on the Productivity Commission approach to estimate the wider social costs of gambling. In 2012 a modified version of the Productivity Commission approach was used to estimate costs in the state of Victoria (28). Overall costs in Victoria were estimated to be between £0.82 billion and £1.52 billion (\$A1.5 and \$2.8 billion 2010 prices). The Victorian analysis assumed that two-thirds of these costs were due to excess expenditure on gambling; this differed from the Productivity Commission analysis which treated excess spending by gamblers as a benefit of gambling, i.e. an expression of the value placed by gamblers on the gambling experience (consumer surplus).

Another more comprehensive analysis of the social costs of gambling in Victoria in 2017 included a wide range impacts on productivity (including absenteeism as well as job loss), family relationships (including violence against family members), crime (including crimes to business), mental health care, emotional distress (including impacts on family members related to relationship problems, suicidal ideation and suicidal events) and financial debt (29). This study estimated total costs per annum to be almost £3.59 billion (\$A7 billion 2014 prices). Most of these costs could be broken down and apportioned between low risk gamblers (Problem Gambling Severity Index

PGSI 1-2) £1.23 billion (\$A2.4 billion 2014 prices), moderate risk gamblers (PGSI 3-7) £0.98 billion (\$A1.9 billion 2014 prices) and problem gamblers (PGSI 8+) £1.23 billion (\$A2.4 billion 2014 prices). This analysis used a technique known as 'regression dominance' to attribute different shares of disability weights associated with problem gambling to different potential consequences of gambling, such as emotional and psychological distress.

Czech Republic: Adapting the Australian approach

The Australian Productivity Commission approach has also been used as the basis for the estimation of the costs of gambling in other countries, including in the Czech Republic (30) and the UK (31). Looking at the Czech example, this made use of a modified version of the Australian Productivity Commission approach to estimate costs in 2012 (30). This study, as in Australia, assumes that 20% of potential costs linked with gambling are in fact the cause rather than a consequence of gambling and only costs for problem and pathological gamblers were included in the analysis. This study, as in Australia, was able to make use of national survey data to identify rates of pathological gambling in the country; it had to rely on other detailed interview data with gamblers to identify a range of financial and criminal justice contacts; and medical professionals were asked for their expert assumptions on levels of depression and suicidal behaviour. Unlike in Australia, the Czech study does include an estimate of costs incurred by the health system related to poor mental health; unit costs per case of depression for the Czech Republic were taken from the published Costs of Brain Disorders in Europe study (32). These costs just relate to the mental health costs of depression rather than any wider physical or mental health problems that may be associated with gambling.

No data are reported on costs of gambling-related harms at an individual level but aggregate costs using a prevalence-based approach to costing over 12 months were estimated to be between £539 million and £616 million (€542 million and €620 million 2012 prices). 62% of costs were for personal and family costs that were difficult to value, so the study authors directly made use of the Australian unit costs for these problems. The costs of suicide, which account for a further 12% of costs, were derived

from an Irish study (33), which in turn made use of UK estimates of the willingness to pay to avoid immediate unexpected death from road traffic accidents. Costs associated with issues that are often flagged as key when looking at the impacts of gambling, debt and crime, accounted for just 0.80% and 13% respectively.

United Kingdom (Great Britain): Adapting the Australian approach

In 2016 an analysis of harm costs in Great Britain only, so excluding Northern Ireland, also took the approach of the Australian Productivity Commission as its starting point (31). It took a narrower more conservative approach to cost estimation only including impacts related to health, welfare and employment, housing and criminal justice, and assuming that relationship and financial debt related costs would arise from these four other areas of cost. For health care costs, the analysis relied on work using data published almost a decade earlier illustrating reporting use of primary care, mental health and other inpatient services by problem gamblers in the 2007 cross-sectional Adult Psychiatric Morbidity Survey (34) and then comparing this with general population use of these services. Criminal justice costs were limited to estimates of the number of individuals in prison due to problem gambling, valued at costs for the average duration of a prison term (3.8 months). Housing costs were restricted to costs associated with statutory homelessness applications for housing, which only covers costs for around the four-week time period needed for processing. Welfare and unemployment related costs were restricted to individuals who were out of work, rather than any other measure. In all cases published unit costs in a UK context were applied to excess utilisation / contacts with different services. Reflecting the authors' acknowledgement of great uncertainty around these costs their illustrative analysis suggested an association between problem gambling and excess fiscal costs to the state of between £276 million and £1.23 billion (£260 million to £1.16 billion 2015 prices). Since publication, the study methodology has begun to be replicated by local government public health departments (e.g. in Swindon as well as Barking and Dagenham) to help inform planning (35, 36).

United States: estimating the impact on health care costs in Massachusetts

A 2018 study in Massachusetts (37) analysed administrative claims data from 599 commercial insurance enrollees with a diagnosis of pathological gambling disorder. It also documented levels of mental co-morbidity, for instance 30% and 14% respectively of these individuals had a primary diagnosis of depression or anxiety disorders. Mean annual health care costs per gambler were reported to range between £6,155 and £7,309 (\$8,000 to \$9,500 2012 prices) per annum, including costs of co-morbidities. The analysis did not seek to identify differences in mean costs between gamblers with and without co-morbidities; nor does it describe the extent to which treatments were for physical rather than mental health. Nonetheless, the authors concluded that these costs should mean that more attention should focus on preventing and treating these disorders noting that “*cost-effective interventions are sorely needed to prevent and ameliorate the adverse health consequences of disordered gambling, and related mental health and substance use disorders, thereby reducing the overall costs of these health conditions.*”

Germany: health care costs of online and offline gambling

Online gambling increases the potential reach and thus potential population level harms of gambling. Moreover, many gamblers will engage in both online and offline forms of gambling, so it is important to understand explicitly the relative contribution of different types of gambling to overall harms of gambling in different contexts. Analysis has looked at the contribution of online gambling to overall levels of problematic gambling and health care costs in Germany in 2018 (38). It sought to identify the causal impact of the specific characteristics of online gambling to overall levels of pathological gambling. Using data from a national telephone survey on gambling and health care treatment utilisation, as well as an earlier estimate from insurance claims data of the annual costs per pathological gambler controlling for co-morbidities and personal characteristics (39), probit regression models were constructed to estimate the relative contribution of online gambling to overall gambling. The analysis estimated for the whole population that the additional health care costs of all pathological gambling were £195.94 million per annum (€ 218.43 million 2018 prices). The regression modelling estimated that 12.7% of these costs were due to online gambling.

It was also able to estimate that 12.94% of pathological gamblers developed gambling problems due to online rather than offline gambling.

Macao: social costs in economies with gambling tourism

There have been several analyses of the costs of gambling in economies where gambling can be a major source of income. One example concerns the Macao Special Administrative Region of China which is the largest casino city in the world and where gambling has undergone liberalisation since 2003. These analyses are of limited relevance to the UK because of the very different context, including a great reliance on gambling tourism, but nonetheless they can still provide insights on approaches to measuring the costs of gambling-related harms. Estimates of costs in 2003 and 2007 were dominated by costs to the police, public prosecutor, and courts related to gambling related crime (40). These accounted for 46% and 62% of total costs of £37.70 and £88.44 million (\$40.45 million and \$106.31 million 2003 and 2007 prices) respectively. The remaining costs were not directly related to harm, but were for regulation and governance, lobbying and advocacy, as well as training and research on gambling. While the framework for costs recognised family and friends physical and psychological health costs, the analysis was unable to put a value on these, while it excluded nearly all costs associated with health care use (other than counselling for gambling), as well as costs associated with financial distress.

South Korea: estimation of loss of financial assets and accumulation of debt

We also identified one estimate of the costs of gambling from South Korea (41). Although the paper speaks of the social costs of gambling the analysis only appears to consider the depreciation of assets resulting from gambling losses, as well as the costs of debts incurred. It does not explicitly value other impacts, although issues such as the risk of criminal activity are documented in the paper. It included a survey of more than 1,800 people from across the country to identify patterns of gambling and the prevalence of pathological gambling. Estimates of costs relating to different types of gambling are then made and an extrapolation of the average costs per individual is extended to make an estimate of annual costs at a national level of more than £6.4 million (6.3 billion Won 2007 prices). This analysis also separately estimated the

economic costs associated with gambling on movements in stocks and share prices by private individuals; if this type of activity were to fall under the definition of gambling then the estimated annual costs would be around £19.0 million (18.5 billion Won 2007 prices).

6.3 Measuring the impacts on quality of life and wellbeing of gambling

There are many different ways of measuring quality of life, many of which look at all aspects of life, including wellbeing. While such broad measures are increasingly used in policymaking, in public health and health care instruments that measure impacts more narrowly on health-related quality of life are more common. In the UK and many other high-income countries a key outcome measure used in health economic evaluation is the quality adjusted life year (QALY). There are different ways in which this can be measured but essentially a QALY with a value of 1 is considered to be a year spent in perfect quality health while a value of 0 is assigned to death. Cost per QALY gained is a major factor in determining whether interventions to improve or protect health are funded; for instance typically interventions that cost less than £30,000 per QALY gained have a strong likelihood of being recommended for funding by the National Institute for Health and Care Excellence (NICE) in England. It is also possible to subsequently place a monetary value on QALYs. NICE, for example, allows QALYs to be expressed in monetary values using an approach called net monetary benefit using NICE's accepted willingness to pay threshold of £30,000. The accompanying costing guide provides further details of such approaches.

The impacts on quality of life of living with any addictive disorders can in principle be estimated, but given the remarkably limited number of economic evaluations of health-related interventions to prevent/tackle gambling related harm there have been few estimates of the impact on quality of life. More focus on eliciting quality of life values was seen as important in our interviews and expert survey. Almost 90% of respondents were in strong agreement with the view that there should be more focus on measuring quality of life.

The scoping review was able to identify a US study where quality of life related to gambling status was measured more than a decade ago in a national survey using the SF-12, an instrument widely used for calculating QALYs (42). Regression analyses on quality of life controlling for gambling status, demographic variables and other risk factors, including alcohol abuse, depression and anxiety disorders, indicated a small but significant deterioration in quality of life as gambling severity increased. The EuroQOL EQ-5D, the preferred instrument for measuring quality of life in economic analyses for NICE in England, has also been used to look at quality of life impacts of problematic gambling in Singapore (43). Several more recent studies are also indicative of an increased interest in using quality of life to help measure the impacts of gambling-related harms, while some interviewee and survey respondents also felt that there might be opportunities to additionally measure wellbeing outcomes.

Switzerland: Estimating and valuing quality of life impacts of gambling

Impacts on quality of life associated with pathological gambling have now been estimated in Switzerland (44) using the SF-12, and then transformed into scores on the SF-6D algorithm used specifically in health economic evaluation for the purpose of estimating QALYs. The SF-6D covers six domains: physical functioning, role limitations, social functioning, pain, mental health and vitality. The Swiss study involved a small group of 52 pathological gamblers receiving treatment and 93 members of the general population. Regression modelling was used to control for co-morbidities such as alcohol disorders and depression, as well as demographic characteristics, with the analysis finding that quality of life was reduced by 0.076 points (which is equivalent to nearly a month of full quality health) as a result of pathological gambling relative to the general population. An existing estimate in a Swiss context of the monetary value of a year in perfect health in Switzerland (£28, 247 – original value: CHF 50,400 in 2007) was then used to estimate the costs of gambling, leading to a cost per pathological gambler of £2,147 (original value CHF 3,830, 2007 prices). The authors also concluded that the study demonstrated that the SF-6D could be used for gambling and that quality of life costs could be included in estimates of the specific social costs of gambling addiction. The results of this analysis were also subsequently included in an analysis of the overall costs of gambling in Switzerland, accounting for between 20% and 30% of total costs (45).

New Zealand: Developing a new approach to measuring quality of life impacts

Analyses in New Zealand have examined the association between levels of gambling and various aspects of quality of life showing an association between gambling and poorer quality of life, but findings were not reported in a form that could be used in economic analysis (46).

More recently attempts were made to use quality of life as a way of estimating the costs of gambling harm in New Zealand (47). Assuming that existing quality of life measures may not be sensitive enough to capture all harms, they sought to develop their own gambling specific approach. To do this separate focus group interviews were held with experts in treating and dealing with gambling-related harms, as well as with individuals with either personal lived experience of these harms as a gambler or a family member of a gambler. Information from these focus groups was fed into an online national survey on gambling harms of 1,542 individuals affected by gambling, who completed an 83 item harms checklist, the Problem Gambling Severity Index (PGSI) and other measures. Survey results, in turn, were used to develop descriptive case vignettes of different gambling harm experiences that were then used with two well accepted health economic approaches to calculating health utility values for estimating quality of life: the Time Trade-Off method and Visual Analogue Scale (See Box 1).

Box 1: Visual Analogue Scale and Time Trade Method

Visual Analogue Scale (VAS)

Using VAS individuals are simply asked to rate different health states on a scale from 1 to 100, with 0 being the lowest possible value and 100 perfect health. The value they choose is then the utility associated with that health state. This method is simple, but it is not recommended as a preferred method for measuring changes in health-related quality of life by NICE in England as it not a choice-based approach.

Time Trade Off Method (TTO)

The TTO is a choice-based approach. Individuals are asked to make a choice between two alternatives – living for a fixed amount of time with a certain level of health or a shorter period of time in perfect health. The time period spent in full health is varied against the poorer health state until the individual becomes indifferent between the two alternatives. Individuals might also be asked how much time they might be willing to give up to avoid living in a specific poor health state. Thus, if an individual was willing to sacrifice two years of a possible ten lived with poor health for eight years in perfect health this would then mean that each year lived in that poor health state would be valued as being 0.8 of a quality adjusted life year. The TTO method is accepted by NICE in England as a methods that can be used for valuing changes in health-related quality of life (48).

Given that the study authors expected harms from gambling to be highly diverse, they conservatively used a large set of condition descriptions to ensure adequate coverage of the population of affected individuals. 324 participants (both professionals and general public) provided a total of 3,888 estimates of reductions in quality of life for 552 unique condition descriptions, randomly selected from cases within each PGSI category (non-problem gambler, low-risk gambler, moderate-risk gambler, problem gambler) from the survey. For each PGSI score (1-15+) a healthy utility score was

then calculated. Annual years of healthy life lost due to gambling-related harm were calculated at a population level leading to estimates ranging from 0.86 QALYs for an individual with the lowest (zero excluded) PGSI score of 1 to 0.43 QALYs for an individual with a PGSI score of 15+. The more sophisticated TTO method, which is generally considered to be preferable to VAS, elicited values for quality of life that were consistently higher than those using VAS.

The impact on the quality of life of other family members was also separately estimated, with individual QALY values ranging from 0.76 for a family member close to a low-risk gambler to 0.66 for someone close to a problem gambler. Utility values for low risk (0.82), moderate-risk (0.63) and problem-gamblers (0.46) were then applied to the New Zealand adult population, combined with New Zealand gambling national prevalence data from 2012.

Results were also presented in comparison with other health conditions. The QALY losses for gamblers were among the higher levels of QALY loss reported when compared to other health problems, with problem gambling being similar to schizophrenia and severe alcohol use disorders. Despite this, the analysis only represents a partial assessment of the impact on quality of life due to additional poor health alone, as the authors did not feel that there was sufficient data available to also look at the impacts of gambling on mortality.

Overall, the study estimated that for the entire 3.6 million New Zealand adult population 67,199 QALYs would be lost every year by gamblers, with 48% of these QALY losses in low-risk gamblers. The New Zealand survey found that 14.4% of adults had been negatively affected by someone else's gambling; overall there were a further 94,730 QALYs lost due to someone else's gambling in the population. This figure conservatively excluded QALY losses for individuals who themselves were moderate-risk or problem gamblers. Approximately 60% of QALY losses due to gambling in the New Zealand analysis would be due to harm to others rather than harm to the gambler. This would suggest that it is very important in any future research, not only to measure impacts on quality of life, but to ensure these include impacts on family members and not just individuals who gamble.

The same authors have used similar approaches, focusing on quality of life impacts related to population wide gambling harms (restricted solely to gamblers rather than others) in Australia. In their analysis in the state of Victoria, 85% of all detrimental impacts on quality of life associated with gambling related harms were incurred by at-risk individuals rather than by those meeting the criteria for problematic gambling (49). The burden of gambling related harms at a population level was again compared with a range of other chronic conditions to show the relative impact of gambling harms.

United Kingdom: Estimating the monetary value of wellbeing losses associated with problematic gambling

In 2017 an estimate was also made of the monetary value of wellbeing losses associated with problematic gambling in the UK, making use of data from the 2010 British Gambling Prevalence Survey, which included a question on the happiness of respondents (17). This study was able to econometrically estimate the relationship between this subjective measure of wellbeing, problematic gambling and income, leading to an estimate of £101,898 (£100,000 2017 prices) per problem gambler per annum in respect of lost wellbeing compared to individuals who were not problem gamblers. This leads to a much higher value than seen in other studies of the costs of gambling, but the estimates cannot easily be compared because of the very different methodologies used.

The authors suggest that one advantage of this approach over conventional estimates of costs is that there is no need to identify specific impacts such as additional health care or crime costs associated with gambling. These should theoretically be captured by the loss of wellbeing, moreover changes in subjective wellbeing potentially may capture some of the impacts of problematic gambling on relationships with family and friends, even though impacts on their wellbeing are not directly measured. Moreover, although not the focus of our report, this approach also theoretically would have taken account of positive impacts on wellbeing.

However, the approach also has some significant limitations, most notably, from a policy perspective these types of cost estimate are less useful as they cannot be readily linked to potential services and sectors of the economy that would benefit from

a reduction in gambling-related harms. Instead the authors looked at impacts on wellbeing relative to taxation policies on gambling. Despite these limitations the study suggests there is scope for further work to refine approaches to valuing wellbeing losses; it also indicates the value of including wellbeing measures within relevant general and gambling specific surveys.

6.4 Other factors

We also identified literature that noted the existence of social costs surrounding gambling but missed an opportunity to put a value on these costs. For instance, a socio-economic analysis of the impacts of gambling in Italy, noted that there were between 0.8 and 1 million people meeting the criteria for pathological gambling, with gambling concentrated in poorer regions of the country, and being the second most common reason for debt. This study, however, was unable to place any monetary value on these impacts. Although the context may be different to that in the UK, it did though observe that social costs included ‘billions of euros’ for organised crime linked to gambling (50).

Studies looking at links between gambling, problematic debt, psychological distress and health service need as in Denmark, Finland and the UK (51-53) were identified. These studies might also be used to help quantify costs and even with cross-sectional data, it is possible to adjust analyses to account for challenges in determining causality, as is illustrated in the following analysis described in this section looking at depression and gambling in the UK (54).

United Kingdom: Regression modelling to look at gambling and depression

The association between gambling and depression in England and Scotland in the general population, rather than solely in pathological gamblers in contact with health care systems, was estimated in a series of Ordinary Least Squares (OLS) regression models (54). The models also specifically tested the hypothesis that online gambling carries greater risks to mental health than offline gambling, given that social interaction

in offline gambling can mitigate against some mental health risks. This analysis made use of cross-sectional data from the 2012 Health Survey for England and the 2012 Scottish Health Survey which contained validated instruments on gambling addiction, as well as questions on depression. In addition, a two stage least squares regression model was run to account for the likelihood that some people may gamble as a result of being depressed.

Even though this analysis is limited by relying on cross-sectional rather than longitudinal data, regression modelling was able to be used to demonstrate support for hypotheses that gambling is associated with depression. Individuals who engage in gambling, even if just social gamblers or low risk gamblers, tend to have higher levels of depression than individuals who do not (or rarely ever) gamble. There was also a significantly greater association between depression and online gambling rather than offline gambling; these results persist when controlling for endogeneity between depression and gambling.

These increased likelihoods of depression could be used to estimate incremental costs of depression at a population level, although it would be useful to also make use of a more clinical measure of depression severity rather than the non-clinical categorical question used in these surveys: 'Have you recently been feeling unhappy and depressed?', where 1 means 'not at all', 2 means 'no more than usual', 3 means 'rather more than usual', and 4 means 'much more than usual'. Possible options include the PHQ-9 and PHQ2 (55). The free to use nine-item PHQ-9 instrument which can be completed in less than five minutes indicates potential cases of depression and their severity. The two-item PHQ-2 flags up individuals who should be assessed further for potential depression.

Table 1: Aspects of gambling-related harms included in selected costing studies

Study	Work / Employment	Money / Debt	Crime	Families	Community	Physical Health	Psychologica l Distress	Mental Health	Other costs / comments
Browne et al (Australia)									Policy, regulation and research on treatment.
Browne et al (New Zealand)									
Effertz et al (Germany)									Split of costs between offline and online provided
Han et al (South Korea)									Outside scope of conventional gambling: Debts associated with gambling on stocks and shares
Fong et al (Macao)									Only included counselling costs for gambling in mental health costs
Kohler (Switzerland)									General social functioning
Rodriguez-Monguio et al (USA)									Includes out of pocket health care payments
O'Neil et al 2008 (Australia)									
Productivity Commission (Australia) 1999									
Productivity Commission (Australia) 2009									
Talamo et al (Italy)									Costs of organised crime around gambling
Thorley et al (UK)									Only included statutory homelessness housing applications in money/debt column
Victorian Competition & Efficiency Commission (Australia)									Included some regulatory costs for preventing / dealing with gambling
Winkler et al (Czech Republic)									Completed Suicide; job search costs

6.5 Learning from other areas: the case of alcohol

There are also many examples of costing analyses and economic evaluations from other areas of public health to draw on. 64 economic evaluations in other areas of harm reduction that look at costs from a broad societal perspective were also identified as part of the rapid screening process. The mapping review also indicates that there is a wide body of literature on costing methodology from other areas of addiction related harm that is relevant and could be applied to gambling (56-58). The review and accompanying guide includes examples of approaches used to place a monetary value on outcomes that do not have an overt market price, for instance to place a value on the loss of life. For example one of these approaches is to make use of estimates updated annually by the UK Department of Transport on the value of a statistical life year (currently £60,000) (59).

One area to learn from is measurement of the costs of alcohol-related harms. There is long standing experience on costing from a public health perspective in respect of alcohol-related harms, dating back to the 1960s (60), with some early studies published in high impact journals in the mid-1970s (61, 62). Here, we provide some brief insights on the methodology and approaches to costing that have been used; potentially these approaches might also be adopted when looking at gambling.

Pan-European work undertaken as part of the Addiction and Lifestyles in Contemporary Europe: Reframing Addictions Project (ALICE RAP) provides an illustration of work to estimate the social costs of alcohol-related harm in three countries: Spain (Catalonia), Poland and Portugal (63). This was done in accordance with an approach previously recommended by the World Health Organization for substance abuse (21), recognising that different assumptions have to be made about the extent to which different health care costs could be fully or partially attributed to addictive behaviours. The emphasis in this analysis was on obtaining data that allows for a *plausible attribution of some costs to addictive behaviours*.

Partners in these three countries in the study were asked to check for the availability of relevant data on service utilisation costs across a wide range of statistical and other

databases. In Poland, additionally a survey was conducted to estimate the impacts of alcohol-related harms on employment. Health care utilisation rates associated with alcohol-harms were based largely on diagnostic codes recorded in electronic health records in these countries.

The concept of population attributable fractions (PAF) was then used to estimate premature mortality associated with alcohol abuse (as well as for tobacco consumption and drug use). This calculation of PAF is common across many analyses of the socio-economic costs of alcohol. Although methods vary the principles are common and information is needed, in this case on the prevalence of drinkers and the relative risk estimate of each alcohol-related consequence. In principle, this methodology could be used, data permitting, to look not only at the health impacts of gambling for both morbidity and mortality, but also at non-health impacts such as criminal activity and time out of work. More work to estimate PAF specifically for gambling does merit further consideration.

Challenges were identified that will be relevant to gambling. Gaps in the availability of data proved to be a significant problem across the three countries, with the most comprehensive estimate of the social costs of alcohol problems, including costs to health services, criminal justice system and other costs (social assistance benefits, social insurance, prevention, education, research) only produced in Poland. Insufficient data were available to estimate many non-health related costs in the other two countries. Another challenge, likely to be common across many countries, including the UK, was the lack of diagnostic coding linked to some types of health care use, while alcohol abuse and other addictive behaviours are rarely recorded as the reason for absenteeism on sick leave records. Nonetheless, the study “*confirmed that costing addiction is in general terms feasible in EC member states and provides very useful data for decision makers in the area of social and health policy*”.

This is just one example of the measurement of costs making use of population attributable fractions. In the previous European study, the emphasis was on obtaining new data for costs. Other studies have to a large extent relied on existing published literature and datasets. For instance, a recent estimate of the costs of alcohol-harms across California relied on a range of published literature to determine the level of

attributable fractions (64). In this study the risks of crashes due to alcohol impairment were based on a single case-control study in California, while assumptions on alcohol-attributable crimes came from a review for a US cost-benefit analysis and attributable hospital inpatient injuries were based on a published review and calculation of risk ratios using US hospital data. Many of the assumptions on hospital presenting injuries were originally found in (often single centre) studies on prevalence of alcohol and substance use in patients hospitalised for injuries. The extent to which alcohol could be attributed to increased risk of other health problems made use of data that had been produced as part of major and influential analysis of the costs of alcohol-attributable global burden of disease data (65) (See Box 2 for further information). This study has been the source of PAFs for several costing studies and covers costs beyond the health care system.

Box 2: Estimating economic costs attributable to alcohol use and alcohol disorders in high income countries (65)

This analysis on alcohol-attributed risks for different health problems was firstly dependent on population level alcohol exposure data, including patterns of drinking. This is potentially analogous to information on population level gambling behaviours, including the identification of those meeting the criteria for pathological and problematic gambling, as well as different levels of risk for problematic gambling, with modelling software used to calculate incidence and average duration of alcohol-use disorders. In addition to diseases which are solely related to alcohol, e.g. alcoholic liver disease, a process was undertaken to identify conditions where alcohol was a contributory factor. *“The establishment of causality required sufficient evidence of: a consistent association (positive or negative) between alcohol consumption and the disease or injury; chance, confounding variables, and other bias being ruled out with reasonable confidence as factors for association; and evidence of a plausible mediating process.”* Long established attributable fraction formulas (66, 67) were used to quantify risk of disease linked to alcohol, combining data on prevalence and relative risk estimates from meta-analyses. This study also reviewed economic literature on alcohol-attributable social costs; the most recent studies from six high (including Scotland) and middle-income countries that used

comparable methods and included direct health care, legal, other direct costs and indirect costs from productivity losses were then synthesised with epidemiological data to provide national estimates of cost. Weighted estimates for high and separately for middle-income countries were calculated; these potentially could be applied to similar income-band countries for whom economic cost data were not available. In Scotland, for example, these costs were £1.51 billion (International \$1.81 billion 2007 prices) or £298 (International \$358 2007 prices) per head of population. 58% of these costs were due to productivity losses, 25% to law enforcement costs, 9% to health care costs and 8% to other direct costs.

While the use of PAF has dominated alcohol costing studies, other approaches have also been used. A recent study in Germany compared health care costs estimated using health insurance data with previous approaches that had made use of PAF (68). Most direct health care costs (for 87% of the population), including any need for long-term care, are documented in the statutory health insurance system. The detailed health insurance data meant that it was possible to identify hospital presenting accidents linked with alcohol. This data was combined with information on rehabilitation to return to work, time out of paid work and non-working activities, early retirement, unemployment and premature mortality. ICD-10³ codes on pain were used to estimate some of the intangible costs associated with alcohol harms. Again, data were also required on the estimated prevalence nationally, in this case of hazardous drinking. A series of regression models were used to estimate life years lost due to alcohol consumption, annual direct and indirect health costs, and the burden of pain and suffering. The overall estimates of costs obtained were similar to those used in previous PAF studies which relied heavily on survey data. The authors concluded that this might suggest that both approaches may be valid to use.

These are just some brief illustrations that suggest that approaches used for alcohol potentially can be adapted for gambling. Indeed, some of the architects of cost of alcohol studies have subsequently also worked on gambling studies. There are also some cautionary lessons that can be learnt from the alcohol experience, and in

³ See <https://icd.who.int/browse10/2016/en>

particular debate in a UK context over the accuracy and relevance of estimates of alcohol harm. While part of this debate is partly ideological between schools of economic thought, a recent discussion paper highlights some areas where the methodology could be refreshed (69), many of which would equally apply to gambling.

A first point in that discussion is that estimates of costs in the UK have been criticised for relying on data that is very old; thus it is important to ensure that updated estimates are made on a regular basis, rather than simply inflating existing (at least four or five year) old estimates of impacts on crime, health care use and productivity losses. In the UK there has also been criticism of the rather simplistic assumption made by the Cabinet Office that 35% of all accident and emergency related attendances could be attributed to alcohol. This was based on one single survey, but other multiple surveys report widely differing results. In applying PAFs, particularly where the assumptions are highly contestable, it would be helpful to make use of multiple UK based surveys to counter this criticism, as well as varying assumptions on these associations to see what impact it has on overall cost estimates.

This discussion paper also argued that there will be some social care costs associated with alcohol harm, something that has not typically been included in estimates. Again parallels can be drawn with gambling here, where we have looked at the impacts for instance of gambling on child welfare. The discussion also recognised the value of the estimation of the full, but transparent, measurement of the societal costs of alcohol problems, including impacts directly on the drinker, such as a decline in health and loss of earnings, as well as external impacts, such as violence, road traffic accidents and impacts on the NHS. It acknowledged that such an estimate though may have less relevance to policy makers than narrower measures focused on costs to the public purse or related to market failure. In any event, it is important to look at the distribution of the costs of alcohol harm to help determine where the marginal costs and benefits may fall in the event of a change in patterns of alcohol consumption.

In other areas of public health we can also point to extensive use of simulation modelling. There are many different examples of simulation models that are used to help estimate the costs of poor health problems, such as dementia (70) or addictive disorders (71), and policy interventions to influence these disorders, as in the case of

alcohol-related harms. Notably Public Health England commissioned models that are now used to inform local decision making in many different areas, including mental health promotion and disorder prevention (72). These models also allow local decision makers to calculate the return of investment from different public health measures; most of these PHE models also indicate which sectors will benefit and over what time period.

NICE in England also always creates economic models when looking at the case for investing in measures to prevent public health problems including addictions. As one of the counterfactuals, these models usually estimate the costs to the public purse and society as a result of not taking action, as has been done when looking at alcohol and smoking related harms. There are numerous examples of the use of modelling approaches outside the UK as well; the return on investment from interventions to tackle alcohol-related harms has been extensively modelled by the OECD and the World Health Organisation (73). The accompanying costing guide also provides information on the use of modelling.

6.6 Strengthening the evidence base

Having scoped the existing literature related to gambling-related harms and undertaken expert surveys and interviews we can conclude there is a considerable degree of variation in methods used to measure and value the costs of gambling. This is by no means unique to the costs of gambling-harms. The scoping review was able to highlight different approaches to measuring costs, including use of approaches used for other health problems such as alcohol-related harm.

Multiple impacts to measure across sectors and families

Just as with the measurement of alcohol-related harms, it is possible to identify many externalities associated with gambling related harms, i.e. harms that have an impact beyond the individual. Indeed all of the harms outlined in the measurement framework report for the Gambling Commission will have externalities. Gambling-related harm is not costless, it has very tangible impacts, for instance on the use of police, criminal justice and other resources, as well as affecting insurance premiums. Falling into unmanageable debt as a result of gambling is not without costs; there are legal costs associated with chasing and dealing with unmanageable debts. There are also increased risks and costs to the public purse related to mental health and self-harm, as well as increased risk of eviction and homelessness. There will also be costs to the public purse in dealing with the consequences of divorce, separation and interpersonal abuse that may result from family breakdowns. Stigma is discussed in the literature, often as a barrier to help seeking for problem gamblers (74), but some surveys of gamblers also highlight the social stigma that is associated with being identified as a problem gambler, e.g. in South Korea (75). Stigma may also lead to some costs being underestimated, for example the stigma associated with financial problems due to gambling may mean that these costs could be under reported, as some individuals will conceal gambling as a causal factor for debt (76).

Gambling harms can lead to work cutback, loss of employment, job change and perhaps the need to move out of an area to find a new job. These productivity losses are never costless and should be included in any analysis. Individuals are unlikely to be instantaneously replaced if they lose their jobs – there will be at least short term costs to workplaces and the economy related to the need to recruit and train new employees. In economies such as the UK where unemployment rates are below 6%, a value considered to be equivalent to technical full employment, productivity losses may be more extensive because of the limited pool of job seekers (see accompanying costing guide for further discussion of these issues). Again, techniques used in other areas of health, where different assumptions can be made about the duration of productivity losses, can be applied to gambling.

Capturing impacts on a wider target population

Survey respondents and interviewees commented on the need to consider some of the wider impacts of gambling on family members, and particularly on children. Few studies to date have considered potentially relevant issues, such as how a lack of parental income will impact on child welfare, and whether child safeguarding issues may arise as a result. In a UK context such issues may well be the primary responsibility of local authorities, who also have much of the responsibility for preventing / mitigating gambling-related harms.

The review was also able to reference recent work to estimate the impact of gambling-related harms beyond individuals who are identified as being problematic gamblers. Individuals at low levels of risk of being problematic gamblers do experience some gambling harms that can have a detrimental impact on their quality of life (49, 54, 77). Some analyses have suggested these impacts are much greater at a population level than those for problematic gamblers. Yet some researchers have argued that these impacts should be weighted to carry less value, with gambling at this level being viewed as a leisure choice rather than a harm (78). Doing that would lead to quality of life not being measured in a constant way which would be problematic; but further work, ideally in longitudinal studies should look at whether there are any long term persistent impacts of being a low risk gambler, and whether this increases the probability of becoming a higher risk gambler over time.

Attributing social harms to gambling

The review has also indicated that there are major challenges in attributing social harms to gambling. This difficulty in attribution, plus the existence of co-morbidities, for instance substance or alcohol abuse, has been cited by some to make it too difficult to identify and apply many social costs to gambling (79). This challenge is not however unique to gambling, it is a common challenge faced when looking at other issues, including alcohol related harms, or when looking at co-morbid mental and physical health problems.

Better longitudinal data is critical to address this issue. The review noted the value that can be gained for making use of longitudinal datasets on gambling behaviours that can potentially be linked to health, welfare and other public service use. Longitudinal datasets can track causality in the development of harms, and for instance, compare health care utilisation for people with gambling disorders alone to individuals who have co-morbid health problems, as well as with individuals who do not have gambling disorders. Datasets in the Nordic countries have long been used for this purpose in the field of mental health (80); there have also been specific longitudinal studies on gambling, as in Sweden, where there have now been five waves of data collected by the Swedish Longitudinal Gambling Study (Swelogs) between 2008 and 2018 (11). In New Zealand the National Gambling Study collected data in four waves between 2012 and 2015 (12). Other examples of longitudinal gambling research can be found in Victoria, Australia (13) and in Massachusetts, United States (14).

Longitudinal datasets that combine data on gambling behaviour with other outcomes or service use pathways could be used to help develop more accurate population attributable fractions for various harms that can be associated with gambling, although one challenge that is not so well pronounced for other issues such as alcohol harms is the importance of the environment in which the gambler is based. If of sufficient length, e.g. perhaps as much as ten years, then it may also be possible to better see the genesis of gambling related harms and subsequent outcomes. They can also be used to analyse other risks for gambling, for instance studies have also shown that there can also be increased risk of having more severe gambling related problems when family members and friends also engage in gambling activities (81)

Learning from areas such as alcohol, work is also needed to better develop methods for attaching PAFs for different consequences of gambling. For alcohol, epidemiological data from different countries has been combined to make PAF estimates. This will be more challenging for gambling. It can be argued that more of the harms of alcohol have a biochemical basis and will apply across different countries, whereas for gambling the regulatory environment, culture and types of gambling opportunity may differ, which in turn may influence both the prevalence of gambling and its consequences (82). Some form of adjustments may need to be made to the

PAF if these data come from different country contexts to reflect differences in the gambling environment.

While longitudinal datasets are invaluable, the absence of longitudinal datasets does not mean that co-morbidities cannot be considered. Issues of attribution and causality can partially be accounted for in cross-sectional datasets using appropriate econometric techniques. Cross-sectional surveys could also include questions on which problem came first, e.g. problem gambling or the other issue. These responses can then be used to adjust assumptions in the economic analysis. In Great Britain regular surveys to measure the prevalence of gambling already include some very limited questions on gambling as a cause of criminality or work/education/ personal relationships as part of the gambling screen. Conceivably some limited additional questions could be constructed that could provide more precise data on whether gambling has led to detrimental impacts on these outcomes, as well as on others such as physical and mental health status.

Another challenge that is discussed in much of the literature is the need to improve the way in which monetary costs are attached to some aspects of gambling-related harms that are not easily measured in monetary terms, such as the social ostracism or impacts on wellbeing of the families, as well as on people who engage in gambling. We can see from other areas, not just from public health economics, but also in other fields such as criminal justice, environmental protection and transport, that governments routinely put a monetary value on intangible positive or adverse events as part of their economic appraisal procedures. This is not considered controversial, it is a standard approach in programme evaluation and cost benefit analysis.

For instance, we can highlight ways in which distress caused to the victims of crime; including being victims of violence or even experiencing the loss of life have been valued. Values for these costs are routinely estimated by government economists in the UK and used to inform policy making (59). We also noted that this is also consistently included in analyses of the case for road and other transport safety interventions. There is scope to make use of some of these published cost estimates to attach credible costs to some of the more intangible costs of gambling. This is certainly the case for placing a monetary value on the costs of completed suicides,

where this approach was used more than a decade ago as part of the development of Scotland's national suicide prevention strategy (83).

Even in situations where it has been argued that "*it is inappropriate to apply an arbitrary monetary amount to something that is clearly nonmonetary in its value or consequences to the participant*" (84), this does not mean that these impacts should be ignored. To do so would "*reinforce the erroneous notion that money is the most appropriate and important metric upon which to judge the impact and/or the overall value of gambling*" (84). The magnitude and impacts of these gambling harms can still be documented using different metric and narrative descriptions, as for example, was the case in a recent assessment of the economic costs of gambling in Massachusetts (84). This means that they can still be considered as part of any overall assessment related to gambling policies, but are not then open to criticism concerning their monetary values. It would then be a matter of subjective judgement for policy makers as to the weight they give these issues compared to other economic considerations on gambling. The cost-consequence approach to economic evaluation, described in the accompanying guide, sets out exactly such a framework.

Capturing impacts on quality of life

The review has also highlighted the potential opportunity to value impacts on the quality of life; this metric is central to economic analysis of public health and health care interventions in the UK and many other high-income countries. It would be prudent to capture impacts on quality of life in any future cost estimations. It is possible to either use existing validated quality of life instruments (to which monetary values can be attached), such as the EuroQol EQ-5D or SF-12, or look at alternative ways of surveying the public and others, as in New Zealand, to obtain views on quality of life. This is something that should be explored in future research.

Although the EQ-5D is the preferred measure used by NICE in making public health decisions, there are doubts as to whether the EQ-5D is sensitive enough for gambling given the instrument's focus partial focus on issues such as physical frailty, although it has been used, e.g. in Singapore (43). Alternative measures to generate quality of life using the SF-12, have also been used to inform NICE's work. We have seen that

the SF-12 has been used in several studies around the world, including Switzerland and the United States, and has the advantage of having a specific set of questions on mental wellbeing. Potentially, a measure now in development in the UK, the REQOL, a ten and twenty item instrument specifically designed to capture quality of life impacts of mental health conditions and the benefits of recovery (85), may be another alternative to the EQ-5D to consider. More generally, an ongoing project involving NICE is investigating the development of an extended QALY to capture impacts beyond health-related quality of life such as independence or improved relationships with friends, family and carers (86).

Lack of economic evaluations

Finally, one striking observation from our synthesis of the literature, interviews and survey is the almost complete lack of economic evaluations of interventions to address gambling related harms with little on treatment other than a very dated analysis (7) or on preventive measures, although there may be some limited analyses within some evaluation reports (87). Nearly all of the literature on cost-benefits related to gambling concentrates on trade-offs between increasing the availability / access to gambling rather than harm reduction, which may in part reflect priorities of study funders, predominantly the gambling industry. This focus is extremely unusual from a public health perspective; there are, for example, numerous economic evaluations linked to harm reduction strategies for other areas of addictive behaviours (88). This may be linked to difficulties and resistance to the use of a public health approach to gambling related harms in policy making (89). One of the challenges remains making arguments that need to reach across multiple sectors and interests when considering public health issues (72).

7 Recommendations

Having reviewed the literature on measuring and valuing gambling related harms, as well as looking at how other types of harm, most notably how alcohol related harms are estimated, a series of recommendations on how to strengthen the evidence base can be made. These are separated into methodology, research and reporting recommendations

7.1 Methodological Recommendations

7.1.1 Incorporate a public health perspective for economic assessment of gambling-related harms

Gambling-related harm is increasingly being seen as a public health issue. It is appropriate for economic analysis of gambling-related harms to adopt conventions and norms used for estimating the economic costs of other public health issues such as alcohol-related harms. This involves identifying and quantifying the impacts of harm across all affected sectors, such as impacts on local authorities that are responsible for many public health actions. This is also essential for any assessment by NICE, or similar bodies within the health system, on the cost-effectiveness of interventions to address gambling-related harms.

7.1.2 Make use of methodologies that deal with the issue of causality

Causality is a significant challenge to the measurement of the costs of gambling-related harms. Does, for instance, problematic gambling lead to poverty or vice versa? This issue is not unique to gambling and has to be dealt with in costing studies for many other conditions, including alcohol and substance abuse. Ideally, longitudinal studies that follow the population as a whole, as well as gamblers, can be used to address causality and estimate population attributable fractions for various harms that

can be linked to gambling. It may be feasible to embed additional questions into existing population surveys; multiple methods for reaching the population, including online surveys, may help increase the overall number of gamblers identified.

It should be possible to make use of data from international longitudinal studies, e.g. from Sweden or New Zealand, in the absence of data from a UK context. Some caution will need to be exercised in doing this. Causality may not be linear; population attributable fractions dependent on robust data from international longitudinal studies may need some form of mediation or other adjustment to reflect differences in the gambling environment, e.g. different regulatory rules, methods of gambling and gambling cultures. The appropriateness of international data will need to be considered on a case-by-case basis. Where data come from cross-sectional sources, advice can also be sought from statisticians on appropriate statistical methods to use to take this issue into account. Questions can also be asked in epidemiological and other population wide cross sectional surveys not only on gambling behaviours and the prevalence of problem gambling, but also about the timing of the onset of gambling relative to the onset of other problems.

7.1.3 The difficulty in attributing multi-morbidities to gambling is not a reason to exclude physical and mental health costs.

Many people with gambling problems will have other health problems. The difficulty in determining causality does not mean that these costs should be ignored. Methods used in recommendation 7.1.2 can help address this issue. Even where there is doubt over attribution, it is still helpful to identify the magnitude of multi-morbidity in gamblers and estimate economic costs so that these costs can be compared with other population groups.

7.1.4 Highlight all relevant impacts of gambling-related harms and not just those that can more easily be measured monetarily.

Estimates of the impact of gambling-related harms should not be limited to those metrics that can more easily be measured monetarily. Key examples of this include impacts on quality of life which can be measured in different ways (see 7.2.2); some of

these subsequently can have a monetary value attached. Even where it is not feasible to use an alternative metric, such as the quality adjusted life year, or place a meaningful monetary economic value on some significant impacts, they should still be described narratively, for instance by reporting the percentage change in the variable and/or the actual number of people impacted. This then allows these impacts to be taken into account in policy and practice. It is also a reflection that not all impacts of gambling-related harms may have an obvious monetary impact, such as the quality of personal relationships, but can nonetheless have profound impacts on individuals and society.

7.1.5 Consider making use of existing governmental estimates on intangible impacts of crime, injury and unexpected loss of life to put monetary values on comparable harms relating to gambling.

Credible estimates of intangible costs associated with many harms that can be linked to gambling are available and regularly updated in a UK context. They are used in a wide range of economic appraisals and analyses. They include government produced estimates of the costs of crime and the statistical value of life. Metrics related to impacts of injury and accidents are also available. Such measures can be used to attach credible costs to some of the intangible costs of gambling-related harms, such as interpersonal violence and suicide.

7.1.6 Measure and value gambling-related harms associated with all levels of gambling

Many studies focus solely on individuals identified as having problematic gambling and/or pathological gambling disorders. There can be costs for all levels of gambling-related harm and not just for individuals who already meet the criteria for problematic / pathological gambling. A focus in some analyses on individuals already in contact with gambling treatment services can overlook impacts on individuals experiencing gambling-related harm who do not access services. Whilst harm may be assumed to increase in association with gambling problems, harms can occur before individuals meet diagnostic criteria and more efforts are needed to understand the level of harms in this wider population group (including in their friends and family). It is important to

ensure that population level estimates of gambling harm consider whether there are substantive harms incurred by these individuals. Sources of evidence on these impacts may come from surveys which document modest levels of gambling behaviour, as well as through qualitative exercises to understand the magnitude of adverse impacts and consequences in this broader population group, as well as for individuals who do not come into contact with treatment services.

7.1.7 Invest in simulation modelling

The evidence base can be strengthened by building simulation models that look at the costs of gambling; these models can be further refined and developed over time. As data become available they potentially allow long term costs of gambling related harms to be calculated. There are many different examples of simulation models that are used to help estimate the costs of poor health problems, such as dementia or addictive disorders, and policy interventions to influence these disorders, as in the case of alcohol-related harms. These models can be used to estimate costs of not taking action (an illustrative example is provided as part of the costing guide), as well as the return on investment of different interventions. NICE in England always creates economic models when looking at the case for investing in measures to prevent public health problems including addictions. Public Health England has also commissioned models that are now used to inform local decision making on health promotion and harm prevention in many different areas, including mental health.

7.2 Research Recommendations

7.2.1 Make use of opportunities to generate data for future longitudinal analysis of gambling related harms

Recommendation 7.1.2 identified the value of longitudinal survey data. Consider whether there are opportunities to routinely embed questions on gambling behaviour into existing longitudinal surveys, as well as considering the scope for new longitudinal cohort studies on gambling. Such new data could also strengthen / validate any simulation models that are developed.

7.2.2 Consider the use of and further development of quality of life metrics when assessing the impacts of gambling related harms

NICE makes use of quality of life as a key metric when developing public health and health care guidance. Given that the instruments typically used for those purposes are weighted towards health-related quality of life, there is a pressing need to assess the extent to which existing measures of quality of life, such as the EuroQOL-EQ-5D and SF-12, can appropriately cover gambling-related harms. The value of using the new REQOL tool which is specific to mental health might be assessed. If existing tools are not sensitive enough to the impacts of gambling, research could also consider developing new gambling specific quality of life tools, drawing on ongoing experience in this area in countries such as New Zealand.

7.2.3 Assess cost effectiveness of actions to minimise gambling related harm

There appears to be very little assessment of the economic case for interventions to address gambling related harms. This is in stark contrast to other areas of addiction where this literature is well developed. Generating estimates of costs of gambling-related harms will be of limited use without also considering policy actions to address these costs. There is also an urgent need to make use of this cost information as part of economic analyses looking at the cost effectiveness of actions to minimise gambling-related harm from public health and/or health system perspectives.

7.3 Reporting Recommendations

7.3.1 Be transparent

There are existing standards on reporting cost of illness studies and health economic evaluations, e.g. (90, 91) (see costing guide for more on this). Adhering to common standards helps in achieving transparency when reporting on methods, assumptions and data sources used to estimate the costs of gambling-related harms. This then also better facilitates transferability of evidence from one context to another.

7.3.2 Separately report impacts of gambling-related harms from the costs of gambling-related harms

When reporting results of any assessment of gambling related harms, it is important to separately report resource and other impacts separately from costs. Similar to the benefits of increased transparency, this is particularly helpful when looking at the potential generalisability of findings between different country (and other) contexts.

7.3.3 Report economic impacts at individual level as well as at aggregate level

As well as reporting aggregate costs of gambling-related harms, costs for individuals and sub-groups should also be reported e.g. average per person costs and costs based on age, different patterns in use of online gambling or socio-economic factors. This may also help policy makers when considering if actions should be targeted at specific population groups.

7.3.4 Report economic impacts from different perspectives and over different time periods

When reporting on costs of gambling related harms it is helpful to disaggregate on which sectors of the economy these costs fall, and the extent to which they are 'cashable' costs or intangible costs. If data are collected over time periods beyond one year, costs over short, mid and long term periods can also be reported. Understanding where and when economic impacts fall can be helpful when seeking to make cross-sectoral arguments for investment in actions to address gambling-related harms.

7.3.5 Measure and report on the distributional impacts of gambling-related harms

As well as reporting on the costs of gambling harms, it is helpful where data allow to report the distribution of these harms, for instance among different socio-economic groups and geographical regions. This allows patterns of inequality in the burden of harm to be identified which can be helpful in decisions on allocating resources to tackle harms.

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Appendix 1: Review search strategies

Medline 1,143 records (PUBMED version 1410)

1. Gambling/
2. Behavior Addictive/
3. Alcoholism/
4. Public Health/
5. GambI*
6. Costs and Costs Analysis/
7. OR/ 1-3
8. 4 AND 5
9. 7 AND 6
10. 8 AND 6
11. 9 OR 10

CINAHL 1,141 records

1. Gambling/
2. Behavior Addictive/
3. Alcoholism/
4. Public Health/
5. GambI*
6. Costs and Costs Analysis/
7. OR/ 1-3
8. 4 AND 5
9. 7 AND 6
10. 8 AND 6
11. 9 OR 10

Psychinfo 384 records

1. Gambling/
2. Addiction/
3. Alcoholism/
4. Public Health/

5. Gamb1*
6. Costs and Costs Analysis/
7. OR/ 1-3
8. 4 AND 5
9. 7 AND 6
10. 8 AND 6
11. 9 OR 10

EMBASE 1497 records

1. Gambling/
2. Pathological Gambling/
3. Addiction/
4. Public Health/
5. Gamb1*
6. Economic Evaluation/
7. OR/ 1-3
8. 4 AND 5
9. 7 AND 6
10. 8 AND 6
11. 9 OR 10
12. Limit articles

SOCINDEX 91 records

1. Gambling Behavior/
2. Compulsive Behavior/
3. Alcoholism/
4. Public Health/
5. Gamb1*
6. Cost/
7. OR/ 1-3
8. 4 AND 5
9. 7 AND 6

10. 8 AND 6
11. 9 OR 10

Criminal Justice Abstracts with Full Text 127 records

1. Gambling Behavior/
2. Compulsive Behavior/
3. Alcoholism/
4. Public Health/
5. Gamb1*
6. Cost/
7. OR/ 1-3
8. 4 AND 5
9. 7 AND 6
10. 8 AND 6
11. 9 OR 10
12. Cost* AND 5
13. 11 AND 12

Econlit records 1,939 records

1. Gambling/
2. Cost*
3. Health/
4. 1 AND 2
5. 1 AND 3
6. 4 OR 5

HMIC Health Management Information Consortium 54 records

1. Gambling/
2. Gamblers/
3. Gambling Machines/
4. Addiction/
5. Public Health/
6. Gambler*
6. Economic Evaluation/
7. Social Costs/
8. Cost of illness studies/
9. Social economics/
10. Social welfare economics/
11. Welfare economics
12. OR/ 1-4
13. 5 AND 6
14. OR / 6-11
15. 12 AND 14
16. 13 AND 14
17. 15 OR 16

Google Scholar Search 3,240

1. Gambling
2. Gamblers
3. Social Cost
4. Public Health
5. 1 OR 2
6. 5 AND 3 AND 4
7. Limit 2009 - 2019

Appendix 2: References included in mapping review

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Appendix 3: Gambling Interview Guide

A. PERSPECTIVES ON GAMBLING-RELATED HARMS

1. We have previously provided you with a copy of the Framework for Action on Gambling Related Harms published by the Gambling Commission and have also asked you to rank the 8 broad categories of harms contained in the Framework (Page 16) in order of their importance (Place an asterisk next to harms that you may wish to indicate have equal weight). What in your opinion are the key components of gambling related harm that should be captured in any evaluation?

Ranking in order of importance
1.
2.
3.
4.
5.
6.
7.
8.

- *[Based on pre-submitted responses follow up to ask respondents about their ranking of actions and why have chosen ranking]*
- *[If for instance rankings suggest that some areas e.g. health are a lower priority than others follow this up].*

2. Looking at the GC framework, (briefly) are there any additional areas of harm that might also be considered?

3. In the GC framework – 9 promising metrics on gambling related harms were described (Pages 18 and 19). We have previously asked you to rank these in terms of ease of measurement .

[Here we now prompts related to ranking, to expand on ease of measurement and then to ask respondent about their preferred approaches to measuring these gambling related harms]

Ranking in order of ease of measurement
1.
2.
3.
4.
5.
6.
7.
8.
9.

4. In seeking to better measure gambling related harms, how important is it to identify not only the costs of harms but who bears these costs, e.g. individuals and their families, specific actors within the public sector, others etc?

5. When looking at measuring gambling related harms (or other similar ‘demerit goods) the timeframe adopted may have an important impact. Is there much evidence from the literature on the durability of effects (even

if not monetised/costed)? What would you advise on how to deal with this issue?

6. **Turning to the issue of causality and gambling related harms – how can measurement deal with the challenge of attributing harms to gambling (or other demerit goods)? For example, economic disadvantage might be both a risk factor for and a consequence of gambling (problems). Another example may be the two-way links between poor mental health and gambling.**

7. **How can we ensure that all critical aspects of the social impacts of gambling–related harms that are not easily amenable to monetisation are included when making assessments of the overall economic impact of gambling?**

[Here we will prompt as appropriate for suggestions on outcome measures for these impacts as well as prompting on how to ensure that any monetary valuations that are placed on these outcomes are seen as credible and not being substantive over or underestimates]

[We could also prompt here to ask for perspectives on the value of qualitative information / narrative experiences of gambling related harms in capturing some of these impacts]

8. **What role practically can surveys and other self-report instruments play in identifying / measuring gambling-related harm?**

B: ENHANCING / WIDENING KNOWLEDGE

- 9. Can you suggest exemplars of approaches to estimating the costs of gambling related harms and/or exemplars concerning other areas of potentially harmful activities, e.g. harmful alcohol consumption, risky behaviours etc, that might be helpful to look at?**

- 10. In the UK (or in your own country if not a UK respondent) context are there specific databases and epidemiological datasets that are available that have or could be helpful to looking at the costs of gambling related harms?**

- 11. Can you also suggest other individuals that we might approach to ask about the costs of gambling related harms and/or about the costs of other potentially harmful activities?**

- 12. Are there any other issues or comments that you wish to make?**

[Noted also in introduction but reinforced here – that we don't now ask specifically question about the background of the individual / or their perspective on gambling related harms but instead seek to elicit information on these factors and also how the country contexts that they are most familiar with may influence their view in a natural manner through their general responses. [If no information has been obtained on these issues we could at our discretion use prompts on this issue as part of the final any other comments question]

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Appendix 5: Detailed study characteristics

Study	Design	Epidemiological Data Sources	Resource & Costing Methodology and Data Sources	Key Assumptions	Key Results
<p>Browne et al (Australia) (29)</p> <p>The social cost of gambling to Victoria</p>	<p>1 year prevalence costing</p>	<p>2014 Victorian Gambling and Health Study weighted dataset. Additional data on harms of gambling were taken from a 2016 convenience sample survey of more than 3,000 Australian gamblers.</p>	<p>Perspective: societal, includes costs to government, emotional and psychological costs, financial impacts, crime, productivity loss, including to business and impacts on relationships and families.</p>	<p>Assumed and included costs for non problem gamblers and their families. Used regression dominance technique to estimate share of disability weights that could be attributed to different consequences of gambling, making</p>	<p>Total costs in Victoria were estimated to be almost \$A 7 billion. (2014/15 prices). Problem gamblers accounted for just one third of these costs; \$A2.3 billion, with low-risk gamblers having costs of \$2.4 billion and moderate-risk gamblers \$A1.9 billion. Impacts on families and relationships were the largest item of costs at \$2.2 billion, of which 45% was due to problem gamblers.</p>

				use of previous survey data.	
Browne et al (New Zealand) (47) Measuring the Burden of Gambling Harm in New Zealand	Development and elicitation of utility values to assess quality of life impacts of gambling related harm	Online national survey on gambling harms of 1,542 individuals affected by gambling, who completed an 83 item harms checklist, the PGSI, and other measures. National prevalence data on gambling in New Zealand, including impacts on others affected by gambling harms	Study not focused on monetary costs but on generating quality of life outcomes related to gambling related harm. 324 participants (both professionals and general public) provided a total of 3,888 estimates of reductions in quality of life for 552 unique condition descriptions, randomly selected from cases within each PGSI category (non-problem gambler, low-risk gambler, moderate-risk gambler, problem gambler) from the survey. For each PGSI score (1-15+) a healthy utility score was then calculated and (1-15+).	Insufficient information to include impacts on premature mortality in quality of life analysis. Only morbidity included.	Overall 67,199 QALYs would be lost every year by gamblers, with 48% of these QALY losses in low-risk gamblers. The New Zealand survey found that 14.4% of adults had been negatively affected by someone else's gambling; overall there were a further 94,730 QALYs lost due to someone else's gambling in the population. Overall 60% of QALY losses in others affected by gambling harms.
Effertz et al (Germany) (38). The Effect of Online Gambling on Gambling Problems and Resulting	1 year prevalence costing	PAGE (Pathological Gambling and Epidemiology), a cross-sectional survey of 14-64 year olds conducted via a computer-assisted-telephone-interview (CATI) procedure from June 2010 to February 2011 in Germany. 307 of 15,023 individuals identified as pathological gamblers (2.04%).	Perspective: health insurers/ public purse. Earlier dataset / publication using administrative claims data for health insurers that covers all medical costs used to identify resource utilisation and costs. Data adjusted to control for comorbidities of problematic and pathological gambling: hazardous alcohol and tobacco consumption,	Total online gambling days to the total online and offline gambling days were estimated. Thus the relative impact of online gambling to	Extrapolated to the whole population, additional health care costs of pathological gambling were € 218.43 million per annum (price year not stated). 12.7% of these costs are due to online gambling. Analysis also estimated that from approximately

Economic Health Costs in Germany			depression and chronic diseases assessed with Charlson comorbidity index as well as a lot of socio economic and demographic parameters. This earlier study focused on alcohol and tobacco consumption but was able also to estimate health care average costs per pathological gambler to be €642 (39).	gambling is can be estimated Analysis adjusted for internet addiction and socio-demographic characteristics: education, sex, age, migration background and family status	1.077 million problematic and pathological gamblers in Germany, 139,322 or 12.94% developed gambling problems due to the Internet.
Fong et al (Macao) (40) The social cost of gambling in Macao: Before and after the liberalisation of the gaming industry	1 year costs in 2003 and 2007; not linked to prevalence	Although epidemiological studies for Macao exist; they were not used in analysis.	Perspectives mixed: Govt costs for legal related expenditure; unclear who bears costs for gambling treatment (might be NGOs) Costs for treating psychological impact of gambling assumed to be the same as reported annual expenditure of four specialised problem gambling treatment centres. Problematic gambling treated in other facilities excluded by authors as some of these costs may be for co-morbidities. Legal system costs partly from public data on gambling related crimes and expert assumption on share of total budgets allocated to gambling related crimes. Unable to value physical and psychological health costs of	Assumes that nearly all health care and financial debt related costs of gambling are privately incurred and are not included in social costs of gambling.	\$0.75m in 2007 for costs of treating problematic gambling, plus \$65.57 million in legal costs. In 2003 legal costs were \$18.58 million.

			families and friends. Price year not reported.		
Han et al (South Korea) (41) The actual condition, participation rate of gambling and prevalence of pathological gambling in South-Korea	1 year costs in 2007, linked to prevalence survey	Stratified cross-sectional national survey of 1,805 adults aged 20 and over.	Perspective: public purse and individuals. Some debt related costs falling on public purse, but most costs falling on individuals and their families. Data on debts associated with different types of gambling were collected in the survey. Cost of debt incurred reported separately from individual losses from gambling.	Also reported separately debts incurred by private individuals betting on stock market movements.	Costs solely relating to debts from gambling were estimated to be £6.3 million; including debts incurred as a result of playing the stock market increased costs to £19 million.
Kohler (Switzerland) (44)	Quality of life survey	52 pathological gamblers were recruited from treatment centres in Western Switzerland and 93 members of the general population.	An existing estimate in a Swiss context of the monetary value of a year in perfect health in Switzerland (CHF 50,400) was then used to estimate the costs of gambling. The results of this analysis were also subsequently included in an analysis of the overall costs of gambling in Switzerland, estimating that they accounted for between 20% and 30% of total costs	Analysis took account of co-morbidity. Causality also examined: onset of depression was post gambling in 72% of gamblers with depression diagnosis.	Quality of life was reduced by 0.076 points as a result of pathological gambling relative to the general population at a cost per pathological gambler of CHF 3,830. The authors also concluded that the SF-6D could be used for gambling and that quality of life costs could be included in estimates of the

					specific social costs of gambling addiction.
O'Neil (Australia) (26) Social and Economic Impact Study into Gambling in Tasmania	1 year prevalence costing	2007 Prevalence Survey in Tasmania, based on telephone interviews with 4051 adults. All respondents were asked to indicate whether they had gambled; the type of activity involved; their attitudes towards gambling in Tasmania; and to provide demographic information. People who gambled on at least one activity were asked to provide details of how often they gambled	Uses approach developed by the Australian Productivity Commission. Only mental health service costs are for counselling. Intangible costs associated with emotional impact of gambling included, plus crime and productivity losses.	As with APC approach did not include health care costs or costs associated with non problem gamblers. Nor costs for actual suicide.	Social costs of gambling range between \$A 8,000 and \$A 25,000. Applied to problem gamblers in Tasmania total costs in 2007 range between \$A 42 and \$A 132 million.
Productivity Commission (Australia) (24) 1999	1 year prevalence costing	Three national surveys commissioned including survey of 10,600 general population on gambling behaviour, survey of 400 clients of counselling agencies; survey of counselling services. Plus use of other existing surveys	Only mental health service costs are for counselling. Intangible costs associated with emotional impact of gambling included, plus crime and productivity losses.	did not include health care costs or costs associated with non-problem gamblers. Nor costs for actual suicide.	Costs of gambling harms estimated to be between \$1.8 and \$5.6 billion per annum (1997 prices) \$6,000 to 19,000 per problem gambler.
Productivity Commission (Australia) 2009 (25)	1 year prevalence costing	Multiple gambling surveys including the Commission's 1999 National Gambling Survey	Only mental health service costs are for counselling. Intangible costs associated with emotional impact of gambling included, plus crime and productivity losses.	did not include health care costs or costs associated with non-problem gamblers. Nor costs for actual suicide.	Costs of gambling harms estimated to be between \$4.7 and \$8.4 billion per annum (2008 prices).

<p>Rodriguez-Monguio et al (USA) (37)</p> <p>The Economic Burden of Pathological Gambling and Co-occurring Mental Health and Substance Use Disorders</p>	<p>1 year prevalence costing</p>	<p>Massachusetts All- Payer Claims Data: a commercially insured health claims database 2009 to 2013. 599 individuals identified with pathological gambling disorder; other mental and substance abuse disorders in this population also identified.</p>	<p>Perspective: Commercial health insurers. Administrative claims data used to estimate costs. 2012 dollars used.</p>	<p>Only includes individuals enrolled by Commercial insurance; individuals with lower incomes of working age were not included in analysis.</p>	<p>Only includes health system costs; Mean annual total expenditures on health care per patient with diagnosis of pathological gambling were \$7993 +/- \$11,847 (bias-corrected 95% confidence interval) in 2009, \$10,054 +/- \$14,555 in 2010, \$909+/- \$13,422 in 2011, and \$9523+/- \$14,505 in 2012.</p> <p>No estimation reported of difference in costs between those with and without co-morbidities.</p>
<p>Thorley et al (UK) (31)</p> <p>Cards on the table: the cost to government associated with people who are problem</p>	<p>1 year prevalence costing</p>	<p>Prevalence of gambling related harms from Health Survey for England, Scottish Health Survey, Welsh Problem Gambling Survey and British Gambling Prevalence Survey. Adult Psychiatric Morbidity Survey 2007</p>	<p>Perspective: government</p>	<p>Focused only on problem gamblers. Crime costs solely limited to prison costs;</p>	<p>Illustrative excess fiscal costs to government of between £260 million and £1.16 billion per year for Great Britain only.</p>

gamblers in Britain					
Victorian Competition & Efficiency Commission (Australia) (28)	1 year prevalence costing	A number of different Australian surveys used to identify problem gamblers and impacts/utilisation related to gambling related harms.	Perspective: Societal, includes both costs to individuals and public purse; includes intangible as well as tangible costs.	As with Productivity Commission assumed that 20% of many social harms would have occurred in the absence of gambling	Overall costs in Victoria estimated to be between \$A1.5 and \$2.8 billion. Two-thirds of these costs associated with costs of excess expenditure on gambling including debt
Winkler et al (Czech Republic) (30) Social Costs of Gambling in the Czech Republic 2012	1 year Prevalence costing	2012 National Substance Abuse Research Survey of 2,134 people aged 15-64. Survey includes some legal judgements. Registry data to enable suicide rates after gambling related psychiatric discharge. Expert interviews with health care staff to estimate risk of depression, suicide and suicidal behaviour in gamblers receiving treatment. Existing study with 229 interviews with gamblers receiving medical treatment to identify rates of bankruptcy, reduced productivity/ employment, being in prison, aggressive behaviour. Convenience sample of 57 gamblers receiving treatment to identify divorce rates and relationship breakdowns; minor and major contacts with police.	Perspective: Societal, includes both costs to individuals and public purse; includes intangible as well as tangible costs. Debt: average debts due to gambling from same National Survey. Courts fees assumed at 5% of cost of debt. Crime and justice: Literature on share of police budget spent on crime and court budgets spent on criminal law. Published data on cost per day of imprisonment. Cost of Brain Disorder Study estimate of costs of depression; suicides costed at same rate as in published Irish study. Health care costs: based on data from one insurer that covers 60% of population. Share of GDP per capita	Costs only incurred by problem gamblers or those with gambling disorder Assumes 20% of gambling disorders are consequence rather than cause of social harm. Used Australian assumption that suicides related to gambling approx	Overall social cost of gambling in the Czech Republic in 2012 were estimated to range between €542 million and €620 million. Crime costs: 13.0% Health: 0.25% Financial: 0.80% Productivity Losses: 11.6% Suicide: 12.5% Personal & Family Costs: 62%

			allocated to family and personal costs. 2015 Euros.	5–10 times higher than gen pop	
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