



# Methodologies and estimates of social costs of gambling: A scoping review

Sari Hautamäki<sup>a,\*</sup>, Virve Marionneau<sup>b</sup>, Sari Castrén<sup>c,d,e</sup>, Jussi Palomäki<sup>c</sup>, Susanna Raisamo<sup>c</sup>, Tomi Lintonen<sup>f</sup>, Pia Pörfors<sup>g</sup>, Tiina Latvala<sup>c</sup>

<sup>a</sup> Tampere University, Faculty of Social Sciences, Kalevantie 4, 33014, Tampere, Finland

<sup>b</sup> Centre for Research on Addiction, Control, and Governance, Faculty of Social Sciences, University of Helsinki, Unioninkatu 33, 00014, Helsinki, Finland

<sup>c</sup> Finnish Institute for Health and Welfare, Department of Health Services, Mannerheimintie 166, 00271, Helsinki, Finland

<sup>d</sup> Social Sciences Department of Psychology and Speech-Language Pathology Turku, University of Turku, Turku, Finland

<sup>e</sup> Department of Medicine, University of Helsinki, Helsinki, Finland

<sup>f</sup> Finnish Foundation for Alcohol Studies, Mannerheimintie 166, 00271, Helsinki, Finland

<sup>g</sup> Finnish Institute for Health and Welfare, RDI Activity and Support Unit, Mannerheimintie 166, 00271, Helsinki, Finland

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## ABSTRACT

The definition and measurement of social costs has been debated in gambling literature. Predominant framings of gambling have depicted it as a leisure activity without significant costs other than those caused directly by problem gambling. This view has been recently challenged with a public health perspective, adopting a wider definition of social costs that span beyond issues related to treatment and crime.

Definitional debates have resulted in highly heterogeneous approaches to calculating the social costs of gambling. The aim of this review is, first, to assess the kind of costs that have been included in existing estimates; second, to compare overall estimates of social costs; and third, to compare methodological differences.

We conducted a scoping review following the Joanna Briggs Institute guidelines for scoping reviews, using the PRISMA-SCR/P tool. The literature search included both peer reviewed publications and grey literature and was conducted in June 2023 and repeated in March 2024. After screening, 26 references were included in the review.

Estimates in the included studies contained direct costs, such as crime and law enforcement, financial counselling, and treatment-related costs. Indirect cost included items such as health and social care, unemployment, and financial cost of divorce. Intangible costs included, for example, quantifications of suicide, emotional distress, and relationship problems. The number of included cost items varied across studies from 5 to 32. We identified seven different methodological approaches to calculating costs. Total estimates using different approaches varied greatly, ranging from 6 to 324,000 million int\$ total, with an average of 3,980 int\$ per adult and median 449 int\$ per adult.

We conclude that the high variation in available total estimates is due to differences in number of cost items and methodological approaches. The results highlight the need for consistent international guidelines for calculating the total social cost of gambling.

## 1. Introduction

Gambling refers to risking something of value on an event with an uncertain outcome, typically with the intent of winning money (e.g. [Productivity Commission \[APC\] 1999](#)). Common forms of gambling include casino products, sports betting, and lotteries, all of which are available both offline and online. Online gambling, on the other hand, refers to the act of participating in any gambling activities through digital platforms or the internet. Gambling is often framed as leisure or entertainment consumption that fuels economic growth and leads to

increased societal wellbeing. Framings highlighting economic benefits and entertainment value have been prevalent in gambling policy across jurisdictions ([Aimo et al., 2024](#); [Korn et al., 2003](#); [Ukhova et al., 2024](#)). Emphasis on economic benefits presupposes that those participating in gambling are rational consumers with the ability to assess their options even when gambling causes negative monetary, health, or social outcomes ([Churchill and Farrell, 2018](#); [Eadington, 2003](#)). Conversely, problems caused by gambling are often viewed as issues affecting a small number of individuals experiencing gambling disorder, without significant societal impacts (cf. [Productivity Commission \[APC\] 2010](#); [1999](#);

\* Corresponding author.

E-mail address: [sari.hautamaki@tuni.fi](mailto:sari.hautamaki@tuni.fi) (S. Hautamäki).

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Castrén et al., 2018).

In the past 15 years, increasing public health attention to gambling, and a growing understanding of industry tactics to encourage excessive consumption, has challenged the predominant, industry-friendly framing (e.g., Hilbrecht et al., 2020; Price et al., 2021). Gambling has been connected to extensive financial, health, and social harms (Browne et al., 2020; Browne and Rockloff, 2018; Marionneau et al., 2023; Muggleton et al., 2021; Wardle et al., 2018). These harms accrue not only to those who engage in gambling, but also to large groups of concerned significant others and to societies (Castrén et al., 2021; Hing et al., 2022; Kourgiantakis et al., 2013; Riley et al., 2021).

Focus on harms has reinvigorated debate on the social and societal costs of gambling. Gambling can generate significant costs via, for example, necessitating increased resources for mental health treatment, bankruptcy filings, and enforcement against criminal activity (Binde et al., 2022; Hofmarcher et al., 2020; Latvala et al., 2019; Wardle et al., 2018). These costs may potentially surpass the anticipated benefits (De Lacy-Vawdon et al., 2023; Reith and Wardle, 2022).

Research into the social costs of gambling is a growing field. One prior review of available social impact studies on gambling, conducted some 15 years ago (Williams et al., 2011), found that most studies at that time had been conducted in the United States and focused strongly on the benefits of gambling on government and business revenue or employment, with only a minority considering negative impacts beyond problem gambling prevalence and crime. A more recent targeted review focused on studies, reports, and grey literature conducted in Australia, and offered insights into costing methodologies (Browne et al., 2017). It found that most Australian efforts relied on the methods used initially in the APC (1999) report, with only small adjustments or updates in terms of data rather than testing new approaches.

Methodological choices are likely to lead to highly varying outcomes. Prior methodological debates (APC, 1999, 2010; Browne et al., 2017; Grinols, 2004; [Victorian Competition and Efficiency Commission [VCEC], 2012; Walker and Barnett, 1999) highlight at least three interrelated issues regarding the measurement of social costs of gambling. First, considerable differences exist in terms of what is considered a social cost. Walker and Barnett (1999) define social costs of gambling as the amount by which gambling reduces aggregate societal wealth. Consequently, private costs (internal costs), borne by individuals or families, are not considered costs. Similarly, welfare support from governments is seen as a transaction rather than a cost, while expenses from gambling-related arrests would constitute a cost as this diminishes overall societal wealth (external costs) (Walker and Barnett, 1999). Others have argued that the impact of gambling on societies should be viewed more broadly as any involuntary negative financial outcomes that stem from non-rational consumption choices and/or harmful product design (e.g., APC, 2010; 1999; Korn et al., 2003; Malach, 2010).

Adopting a broader view of social costs involves a distinction between direct, indirect, and intangible costs. The inclusion (or exclusion) of these categories in cost estimates depends on definitions. Direct costs result directly from the measured activity and would not occur in its absence. These are, for example, treatment or legal costs (Patel and McDaid, 2019; Thavorncharoensap et al., 2009). Indirect costs are other negative externalities that expand beyond direct costs, such as productivity losses at work (Hofmarcher et al., 2020; Patel and McDaid, 2019). Both direct and indirect costs are tangible, and primarily monetary (VCEC, 2012). In contrast, intangible costs include many non-monetary negative impacts on individuals, families, and societies (Chalaguine, 2018). Intangible effects reduce quality of life or increase suffering via, for example, emotional distress and relationship breakdown (Patel and McDaid, 2019). There is no standard to quantify intangible costs, although some attempts have been made (APC, 2010; 1999).

Second, differences in how social costs are measured also depend on assumptions made on the direction of causality between gambling and harms. Gambling is related to various comorbidities or co-occurring

conditions, including depression, substance-based problems, relationship breakdowns, and suicide attempts (Lorains et al., 2011; Yakovenko and Hodgins, 2018). The causality between gambling and these issues has been debated, with methodological choices varying in terms of which costs are primarily linked to gambling and how the linkage is assessed (Eadington, 2003; Grinols, 2004). Different causality adjustments and assumptions on causality will likely lead to highly differing total cost estimates.

Third, calculations of direct costs can be based on existing statistical information from national reports (Lucchini and Comi, 2022), health care registers (Vestergaard et al., 2023), national surveys that estimate the prevalence of problematic gambling, or even, in some cases, expert opinions. Available tools to measure problematic gambling include the Problem Gambling Severity Index (PGSI; Ferris and Wynne, 2001) and The South Oaks Gambling Screen (SOGS; Lesieur and Blume, 1987) that identify and quantify risk and problem gambling (PGSI) and pathological gambling (SOGS) (cf. Browne et al., 2017; Lucchini and Comi, 2022; Holtgraves, 2009; Grinols, 2004). The inclusion of different categories of problematic gambling in calculations are likely to be reflected as important variations in terms of social cost estimates.

Cost calculations are important political tools (Room, 2012) and subject to widespread academic and public interest. Diverging perspectives and alternative interpretations, particularly from industry stakeholders, have created a contentious landscape that underscores the urgent need for rigorous, standardised methodologies that produce defensible and comparable results. However, unlike for many substance-based addictive consumptions (cf. Manthey et al., 2021; The World Health Organisation [WHO], 2020; Single, 2003) there has been no gold standard recommendation on the best methodology to calculate the social costs of gambling. The most comprehensive prior attempt at a gold standard was the Socio-Economic Impact of Gambling (SEIG) framework, the validation of which proved unfeasible (Anielski and Braaten, 2008; Anielski and Wynne, 2009).

This paper aims to address these challenges by synthesising existing studies on the societal costs of gambling and proposing foundational steps toward a standardised framework. Using a scoping review methodology, we evaluate and summarise 1) the direct, indirect, and intangible costs included in social cost estimates for gambling; 2) compare the available estimates of the total costs of gambling to society; and 3) methodological differences across the reviewed studies. We produce evidence-based recommendations for future social cost measurements in the field of gambling, thereby supporting policymakers in addressing the complex social and economic impacts of gambling.

## 2. Method

This scoping review was conducted in accordance with the JBI (Joanna Briggs Institute) guidelines for scoping reviews (Peters et al., 2020) and with the PRISMA-SCR/P tool with extension for scoping reviews (Page et al., 2021; Tricco et al., 2018). The details of the review were pre-registered as a protocol in Open Science Framework <https://doi.org/10.17605/OSF.IO/GRJST>.

Our research questions are: 1) How have the social costs of gambling been defined and calculated in earlier work? 2) What have the results shown? and 3) What conclusions can be drawn by synthesising and summarising existing findings?

### 2.1. Search strategy

A systematic search strategy was developed to identify studies relating to the social cost of gambling, published between 1999 and March 2024. The choice to limit the search to studies published after 1999 was motivated by the fact that the APC published its first social cost estimate in that year (APC, 1999). The APC study continues to be a highly cited source for social cost measurement in the gambling field. As peer-reviewed literature in the field is scarce, we also included grey

literature. We included sources in all languages. The final sample contains studies in English, French, German, Norwegian, and Swedish.

The literature search was conducted by an information specialist (PP). The search included free text terms and controlled vocabulary terms for 1) gambling and problem gambling (gambling, gambling disorder, at-risk gambling etc.) and 2) costs (costs, cost analysis, health care costs, health expenditures, cost-benefit analysis, societal costs etc.) The search strategy was developed and tested against a predefined set of studies identified by the authors and evaluated using the PRESS Peer Review of Electronic Search Strategies checklist for electronic searches. For full search strategies and the PRESS evaluation, see Appendix Search strategy (see Appendix 1: Review Search Strategy).

The literature search for published studies was conducted in June 2023 and repeated in March 2024. Searched databases were Medline (OVID), APA PsycInfo (EbscoHost), CINAHL (EbscoHost), SocIndex with fulltext (EbscoHost), ASSIA (ProQuest), Social Services Abstracts (ProQuest) and Web of Science Core Collection. The total number of records retrieved from both searches was 1,740, with 1,087 records remaining after duplicate removal.

Searched sources for grey literature were IDEAS/RePEc, Ebsco Discovery Service, Google Scholar, and Google. The total number of records retrieved was 4,166. All records were preliminary screened by the information specialist (PP) based on title, abstract or other available data. 121 records were selected for further screening. Finally, reference lists of all included studies were screened to identify any additional studies. Overall, 12 references were screened at this stage and eight of these were selected.

## 2.2. Inclusion criteria and study selection

We included all studies estimating social costs of gambling, published after 1999. All members of the research team participated in screening the complete set of 1,208 studies using predefined inclusion criteria. The first screening resulted in 62 relevant sources that were assessed in detail by three members of the research team (SH, TL, VM).

Our inclusion and exclusion criteria were as follows: We included all

studies that considered the costs of gambling in general. We excluded studies that examined the social cost of only one gambling type (e.g., casino gambling) or only individual cost types (e.g., only health care costs). One study focused on online gambling but was still included because it also provided cost estimates related to gambling in general (Chalaguine, 2018). We also excluded studies that focused on costs to a specific social group, such as veterans. Review studies and methodological discussion papers were also excluded. As our aim was to assess the social costs of gambling, we did not extend our review to studies charting social benefits of gambling.

The full texts of the remaining references (41) were assessed against the inclusion criteria. Each study was first independently assessed by three members of the research team (SH, TL, VM) and then discussed in the full group. At this stage, we also excluded references that did not provide an adequate description of their methodology for the calculations. The final sample consists of 26 studies. The overall study selection process is presented in Fig. 1. A data extraction chart with the selected 26 references is available in Table 1.

## 2.3. Data extraction

We extracted data from the included papers using a data extraction chart developed by the research team. Variables for data extraction included author, publication year, article type (peer-reviewed publication or non-peer-reviewed report), research location, funder (if mentioned), key findings, as well as levels of problematic gambling and types of gambling considered.

## 2.4. Data analysis and presentation of results

We first summarised the key findings based on the data extraction chart. Accuracy was ensured by cross-verification of key findings for each question in the research group. We then produced an analysis of estimates on the overall costs of gambling and methodological differences in measurement.

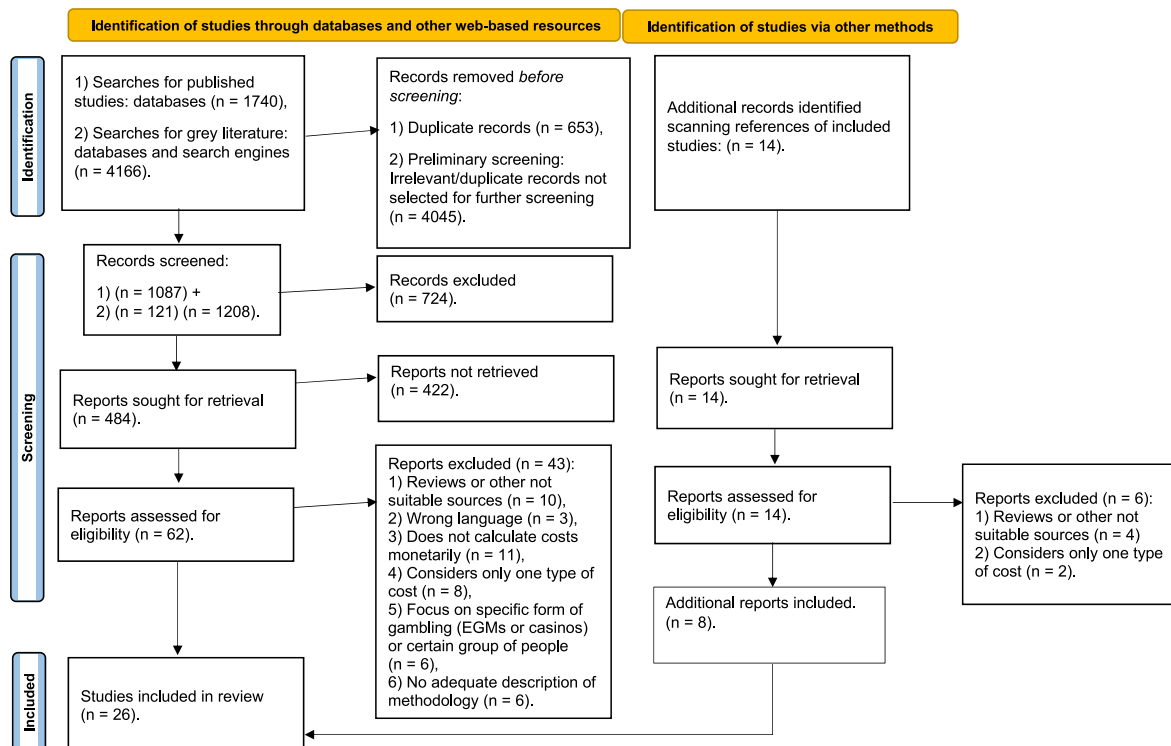


Fig. 1. PRISMA flow diagram on search strategy and source selection.

**Table 1**  
Study characteristics of the included studies.

Ref.	Author/institution	Title	Year	Country/area	Form	Funding	Types of costs
1	Bhattacharjee et al. (NIESR-report)	The Fiscal Costs and Benefits of Problem Gambling: Towards Better Estimates	2023	UK	Report	Gambling Commission	Direct
2	Chalaguine	What Are the Costs and Benefits of Internet Gambling for Society? Evidence From the United Kingdom	2018	UK	Peer-rev. publication	Not mentioned	Direct & Intangible
3	Browne et al.	The social cost of gambling to Victoria	2017	Victoria, Australia	Report	Victorian Responsible Gambling Foundation	Direct, Indirect, & Intangible
4	Fong et al.	The social cost of gambling in Macao: Before and after the liberalization of the gaming industry.	2011	Macao	Peer-rev. publication	Not mentioned	Direct
5	Westphal et al.	Estimating the Social Costs of Gambling Disorders in Louisiana for 1998	1999	Louisiana	Report	Not mentioned	Direct & Indirect
6	Žofčák & Šíma	Revision of Social Costs of Gambling in the Czech Republic	2022	Czech	Peer-rev. publication	Not mentioned	Direct
7	Hofmarcher et al.	The societal costs of problem gambling in Sweden	2020	Sweden	Peer-rev. publication	Primarily from Svenska Spel (industry)	Direct, Indirect, & Intangible
8	Australian Productivity Commission (APC)	Australia's gambling industries	1999	Australia	Report	Australian Government	Direct, Indirect, & Intangible
9	Australian Productivity commission (APC)	Gambling	2010	Australia	Report	Australian Government	Direct, Indirect, & Intangible
10	Victorian Competition and Efficiency Commission (VCEC)	Counting the cost: inquiry into the costs of problem gambling	2012	Australia	Report	Victorian Government	Direct, Indirect, & Intangible
11	Winkler et al.	Social Costs of Gambling in the Czech Republic 2012.	2016	Czech	Peer-rev. publication	Ministry of Finance of the Czech Republic and by the project "Sustainability for the National Institute of Mental Health"	Direct, Indirect, & Intangible
12	Allen consulting group + others (ACG)	The Social and Economic Impact Study of Gambling in Tasmania Survey 2011	2011	Tasmania, Australia	Report	Not mentioned	Direct, Indirect, & Intangible
13	Office for Health Improvement and disparities (OHID)	The economic cost of gambling-related harm in England: evidence update 2023	2023	England, Britain	Report	Department of Health and Social Care (DHSC)	Direct, Indirect, & Intangible
14	Public Health England (PHE)	Gambling-related harms evidence review: the economic and social cost of harms	2021	England, Britain	Report	Department of Health and Social Care (DHSC)	Direct, Indirect, & Intangible
15	Lucchini & Comi	Social Costs of Gambling Harm in Italy	2022	Italy	Peer-rev. pub	Italian Federation of Workers of the Addiction Departments and Services	Direct, Indirect, & Intangible
16	Thorley, Stirling & Huynh (IPPR Report)	Cards on the Table—The Cost to Government Associated with People who are Problem Gamblers in Britain.	2016	Britain	Report	Gamble Aware	Direct & Indirect
17	Gerstein et al. (NORC-report)	Gambling impact and behavior study	1999	USA	Report	Not mentioned	Direct & Indirect
18	Thompson & Schwer	Beyond the Limits of Recreation: Social Costs of Gambling in Southern Nevada	2005	Southern Nevada, USA	Peer-rev. pub	Not mentioned	Direct & Indirect
19	Becker	Soziale Kosten des Glückspiels in Deutschland	2011	Germany	Report	Not mentioned	Direct & Indirect
20	Kristensen, Leino & Pallesen	Den samfunnsøkonomiske kostnaden av problemspilling i Norge	2022	Norway	Report	Lotteri- og stiftelsestilsynet (Norwegian Gambling and Foundation Authority)	Direct, Indirect, & Intangible
21	Vestegaard et al.	Comorbidity, Criminality, and Costs of Patients Treated for Gambling Disorder in Denmark	2018	Denmark	Peer-rev. pub	Institutional research grants to (and administered by) Aarhus University	Indirect
22	O'Neil et al. (SACES)	Fifth Social and Economic Impact Study of Gambling in Tasmania 2021. Volume 1: Industry Trends and Impacts.	2020	Australia	Report	Not mentioned	Direct, Indirect, & Intangible
23	Health Services Policy Research Group (HSPRG)	The Costs and Consequences of Gambling in the State of Delaware	2002	Delaware, USA	Report	Not mentioned	Direct & Indirect
24	Whetton et al.	The social costs of gambling harms in the Northern Territory in 2018	2018	Northern territory, Australia	Report	Northern Territory Government Department of	Direct, Indirect, & Intangible
25	Jeanrenaud et al.	Le coût social du jeu excessif en Suisse	2012	Switzerland	Report	Industry, Tourism and Trade through the Community Benefit Fund.	Direct, Indirect, & Intangible
26	Gustafsson et al.	Samhällets kostnader för spelproblem i Sverige 2021 – En uppdatering	2021	Sweden	Report	Folkhälsomyndigheten	Direct, Indirect, & Intangible

**Note.** Ref. = Reference number. Peer-rev. pub = Peer-reviewed publication.

2.4.1. Comparability of cost items

To arrive at a comparative framework across studies, we analysed the types of costs included in calculations. Cost items were first grouped into direct costs, indirect costs, and intangible costs (level 1 categorisation). These were further subdivided. Direct costs were divided into five subcategories (level 2):

1. Costs of crime and law enforcement,
2. Costs due to financial hardship,
3. Treatment costs for problem gambling,
4. Costs of research, education, and prevention,
5. Regulation and health promotion costs.

Indirect costs were subcategorised into:

1. Health and social care costs,
2. Divorce-related costs,
3. Unemployment costs,
4. Cost related to reduced productivity.

Intangible costs are more challenging to quantify monetarily but these were also included in many of the social cost calculations. We subdivided these into:

1. Cost of emotional distress,
2. Cost of physical distress,
3. Cost of reduced quality of life,
4. Cost of financial distress,
5. Emotional cost of suicides,
6. Emotional cost of relationship problems,
7. Emotional cost of physical violence,
8. Emotional cost of crime.

Some of these subcategories were further divided into lower-level (level 3) categories, presented in detail in Table 2 in the results sections.

2.4.2. Monetary evaluation

Given the uncertainty in estimating the various social costs of gambling, many studies provide both low- and high-end cost estimates.

**Table 2**  
Categorised cost items included in the estimations.

Cost type	Cost category	Included cost	References	
DIRECT COSTS	Crime and law enforcement	Police encounters	1,3,4–12,18,20,22,24,26	
		Court cases/judicial costs	1–12,15,18,19,20,22,24,26	
		Penal system	3–16,18,19,20,22,24,26	
		Thefts	3,5,18	
		Victim of crime	6,7,24	
	Financial hardship	Unpaid debts	2,3,5,10	
		Financial counselling & debt management	7,18–20,26	
		Cost of bankruptcy administration	3,6,8–12,18,26	
		Excess gambling expenditure	3,10,24	
		Illegal offshore wagering	3	
INDIRECT COSTS	Health and social care	Rent-seeking cost	4	
		Treatment for PG	3–5,7–12,15,17,20,22–26	
		Research, education & prevention	3,4,7,10,15,19,20,22,24,26	
		Regulatory & promotion	3,4,7,10,20,26	
		Homelessness services	1,3,13,14,16,26	
INDIRECT COSTS	Health and social care	Welfare payments	1,2,17,18,22,23	
		Health and human services	3,10,21	
		General Health services	1,2,7,16–19,20,23	
		Mental health care	1,3,7,13,14,16,23	
		Treatment for other addictions	13,14	
	Divorce	Financial cost of divorce	3,7–10,12,15,19,26	
		Reduced productivity	3,5,7–12,15,19,20–22,24,25	
	INDIRECT COSTS	Reduced productivity	Work absence	3,5,7,18,19,20,24,26
			Earnings loss	3,5,8–10,12,22,24,25
			Job search	3,8–12,22,24
Staff replacement			3,7–12,17,20,22–24,26	
Productivity loss due to suicide or premature death			3,7,20,26	
Unemployment		Reduced performance outside work	8–11	
		Unemployment payments	3,5,10,13–18,20,23,26	
		Loss of tax receipts	10,16	
		Job loss (fired/quit)	7,18,19	
		Depression of gambler	2,3,8,9,11–13,20,22,24	
INTANGIBLES	Emotional distress	Depression of parent/immediate family	20,24	
		Emotional distress of gambler	3,7,10,22,24,26	
		Emotional distress of parents/immediate family	2,3,7–12,22,24	
		Physical ailments and somatic illnesses	20,26	
		Reduced quality of life (gambler)	25	
	Physical distress	Quality of life	25	
		Reduced quality of life (immediate family)	25	
		Financial distress	Distress because financial situation	22
		Suicide	Emotional distress of attempted suicide (gambler)	2,3,11,12,20
			Emotional distress of attempted suicide (parents/immediate family)	2,3,8,9,11,12,20
Emotional distress of suicide ideation (gambler)	3,8,9,11,12			
Emotional distress of deaths by suicide (parents/immediate family)	3,11,20			
Value of lost life	13–15			
Relationships problems	Emotional cost of divorce & separation (gambler)	3,8,9,11,12, 17,19,20,22		
	Emotional cost of divorce & separation (partner/immediate family)	2,3,11,20,22		
	Emotional distress of violence (gambler)	3,7–9,12,20		
	Emotional distress of violence (parents/immediate family)	2,3,7,11,20		
	Crime	Emotional distress of crime victims	20,26	

Note.

We present both the low and high-cost estimates for studies that had both. When studies provided three cost estimates (lowest, highest, and middle point), only the lowest and highest were included in the tables. While some studies also presented lifetime gambling costs, we focused exclusively on past-year costs.

To ensure comparability of monetary evaluations, we: (1) adjusted cost estimates provided in local currency to 2023 values using the [inflation tool](https://www.inflationtool.com) (<https://www.inflationtool.com>); (2) converted these adjusted amounts into 2023 international dollars (Int\$) using International monetary funds' conversion rates ([International Monetary Fund \[IMF\]](https://www.imf.org)). The international dollar is an artificial currency used to neutralise the effects of purchasing power differences across national economies. To further improve comparability, total costs are presented as cost per resident over 15 years of age within the jurisdiction. In cases where costs were presented in a foreign currency (e.g., in euros in Sweden, Denmark, and The Czech Republic), these were first converted back to 2023 values in local currency and then into international dollars.

In addition to overall valuations, we produced separate categorisations of the values attributed to direct, indirect, and intangible costs. These subcategories were also analysed as percentages of the total. For studies that presented only low- and high-end cost estimates, we used the 'middle point' between these as a single cost estimate in visualisations.

### 3. Results

#### 3.1. Sample characteristics

The full included sample of studies is presented in [Table 1](#). Of the 26 included studies, 17 presented cost estimates at a country-level and ten produced subnational estimates. Over half of the studies ( $n = 15$ ) were conducted in a European context. Four studies were from North America ([Gerstein et al., 1999](#); [Health Services Police Research Centre \[HSPRG\], 2002](#); [Thompson and Schwer, 2005](#); [Westphal et al., 1999](#)), seven from Australia ([The Allen Consulting Group \[ACG\], 2011](#); [APC, 1999, 2010](#); [Browne et al., 2017](#); [O'Neil et al., 2021](#); [VCEC, 2012](#); [Whetton et al., 2021](#)) and one study from Asia, Macao ([Fong et al., 2011](#)). Most of the included studies ( $N = 18$ ) were grey literature reports.

We also noted sources of funding and declarations of conflicting interests when these were available. Ten studies clearly reported a source of funding. Four of these were funded by a foundation or institution that funds gambling studies ([Bhattacharjee et al., 2023](#); [Browne et al., 2017](#); [Thorley et al., 2016](#); [Vestergaard et al., 2023](#)) and one by a gambling company ([Hofmarcher et al., 2020](#)). Five studies were funded by government bodies ([Gustafsson et al., 2021](#); [Jeanrenaud et al., 2012](#); [Lucchini and Comi, 2022](#); [Whetton et al., 2021](#); [Winkler et al., 2016](#)). Four studies were issued by governments, and we assumed that these were government-funded despite lack of explicit funding statement ([APC, 1999, 2010](#); [OHID, 2023](#); [Public Health England \[PHE\], 2021](#); [VCEC, 2012](#)). The remaining 13 studies did not indicate an identifiable source of funding within the report.

Since our aim was to assess the calculation of total costs of gambling, all included studies at least presumably considered all types of gambling. Some reports provided a list of types of gambling included in calculations ([APC, 2010](#); [Browne et al., 2017](#)). Some reports, such as [O'Neil et al. \(2021\)](#), [Gerstein et al. \(1999\)](#), and [VCEC \(2012\)](#), presented types of gambling as descriptive statistics, indicating the types of gambling played by people with gambling problems. However, these types were not separated in the actual calculations. Only two reviewed studies examined costs by gambling types ([APC, 1999](#); [Becker, 2011](#)). In [Becker's \(2011\)](#) study, highest total social costs were estimated for non-casino electronic gambling machines (EGMs) (225 million euros/year). Cost estimates for casino EGMs (36 million euros/year), other casino products (31 million euros/year), sports betting (30 million euros/year) and lotteries (3 million euros/year) were much lower. Similarly in the APC report, EGMs yielded the highest social costs (1,

369–4,250 million dollars) yearly. All included sources focused on the cost of different levels of problematic gambling.

#### 3.2. Cost items included in the estimates

[Table 2](#) provides an overview of the cost items included in the studies. Over half of the studies ( $n = 15$ ) reported direct, indirect, and intangible costs in their estimates. Five studies reported direct and indirect costs, but not intangible costs ([Becker, 2011](#); [Bhattacharjee et al., 2023](#); [Gerstein et al., 1999](#); [HSPRG, 2002](#); [Thorley et al., 2016](#)). Two studies presented direct cost estimates only ([Fong et al., 2011](#); [Žofčák and Šíma, 2022](#)), with one study focusing on indirect costs only ([Vestergaard et al., 2023](#)). Three studies provided an uncategorised total estimate ([APC, 2010](#); [Thompson and Schwer, 2005](#); [Westphal et al., 1999](#)).

##### 3.2.1. Direct costs

All studies that included direct costs reported costs related to crime and law enforcement. This category was subdivided into costs of police, juridical costs from civil and criminal justice, court appearances or trials, and costs related to the penal system, including incarceration and probation. In addition, some studies separately examined costs of gambling-related thefts ([Browne et al., 2017](#); [Thompson and Schwer, 2005](#); [Westphal et al., 1999](#)) and cost related to crime victimisation ([Hofmarcher et al., 2020](#); [Whetton et al., 2021](#); [Žofčák and Šíma, 2022](#)).

Costs of financial hardship were considered in sixteen studies. These cost items included unpaid debt, administrative or counselling costs associated with financial difficulties, and costs of bankruptcy administration. Additionally, a few studies considered financial harm resulting from excessive gambling expenditure ([Browne et al., 2017](#); [VCEC, 2012](#); [Whetton et al., 2021](#)), illegal offshore wagering ([Browne et al., 2017](#)), and rent-seeking costs ([Fong et al., 2011](#)). Rent-seeking costs refer to the monetary impact of corporate lobbying for legalisation or industry-friendly regulation of gambling, as well as costs of lobbying efforts to oppose these developments.

Treatment costs for problematic gambling were investigated in twelve studies. In one study ([Kristensen et al., 2022](#)) this cost included treatment for negative consequences of problematic gambling and funding for non-profit organisations. Costs associated with gambling research, education, and harm prevention were examined in ten studies. Regulation costs were considered in six studies and gambling promotion by the governmental tourist office in only one study ([Fong et al., 2011](#)).

##### 3.2.2. Indirect costs

Indirect health and social care costs were included in 16 studies and consisted of items related to both healthcare and social welfare. These included welfare payments, general health service costs (such as outpatient and hospital care or general practitioner consultations), mental health care costs, and costs of homelessness services. Some studies also calculated the cost of health and social services, which included both healthcare and social welfare ([Browne et al., 2017](#); [VCEC, 2012](#); [Vestergaard et al., 2023](#)). Two studies ([The Office of Health and Disparities \[OHID\], 2023](#); [The Public Health of England \[PHE\], 2021](#)) included treatment costs for other addictive consumptions, such as illicit drug use and alcohol dependence. Health and social care costs were combined to account for variations in health and social systems across countries. Divorce-related costs were also calculated in terms of the administrative costs accruing from divorce processes.

Reduced productivity at work or studies was included in most studies. Most of these monetised productivity losses using a human capital approach, where any hour not worked is interpreted as an hour lost. One study used the fractional costs approach which takes the employer's perspective, and only counts lost hours until another employee takes up the work ([Becker, 2011](#)). Two studies also quantified productivity losses due to suicides ([Browne et al., 2017](#); [Hofmarcher et al., 2020](#)). Other work-related costs included costs of absence from work

and the costs of changing jobs, considering monetary impacts on both employee and employer. Four studies examined loss of productivity outside of work (APC, 1999, 2010; VCEC, 2012; Winkler et al., 2016). In addition to reduced productivity, costs of unemployment were also included. Unemployment-related costs were further subdivided into costs resulting from unemployment payments, loss of tax receipts, and job loss due to quitting or firing.

### 3.2.3. Intangible costs

Intangible costs relating to emotional distress were assessed in 14 studies. The category included general emotional distress, emotional distress of crime victims, physical distress, financial distress, and depression. Categories were further subdivided based on the individual who was experiencing the distress or depression (e.g., the individual engaging in gambling or immediate family members). Overall, 15 studies included intangible costs to family members. One study also addressed reduced quality of life (Jeanrenaud et al., 2012). Emotional cost of suicides was included in the cost estimates and related to the burden of suicide ideation, attempted suicide, completed suicides, and value of lost life because of suicide. The intangible costs of relationship-related emotional distress included the negative impacts of relationship breakdowns or divorce. Eight studies also accounted for emotional distress resulting from family violence. These effects included the intangible costs of victimisation and perpetration.

### 3.3. Overall social costs of gambling

Table 3 provides the lowest and highest estimates of direct, indirect, intangible, and total social costs of gambling converted into international dollars. Total costs divided by the adult population size (aged 15 years or older) and the share of the direct, indirect, and intangible costs from total costs are also presented. Fig. 2, left-hand-side panel depicts the log-transformed 'middle cost' estimates for direct, indirect, and intangible costs, as well as their sum as total cost; the right-hand-side panel depicts log-transformed total cost (per adult population) estimates with mean and median estimate values as vertical lines. If a reviewed article presented only low and high-end cost estimates, the middle point between these estimates is used.

In most studies reporting direct, indirect, and intangible cost estimates, the share of the direct costs ranged from 0.2 to 0.5% (Chalaguine, 2018) to 52.3–71.5% (VCEC, 2012) of the total cost. The share of indirect costs ranged from 1.2 to 2.3% (Chalaguine, 2018) to 69.7–77.7% (Jeanrenaud et al., 2012) of the total cost while the share of intangible cost ranged from 12.6% (Lucchini and Comi, 2022) to 98.6% (Chalaguine, 2018) of the total cost estimates. Intangible costs represented the largest proportion of the total cost in eight studies (e.g. APC, 1999; Browne et al., 2017; Winkler et al., 2016), indirect costs in six studies (Becker, 2011; Gustafsson et al., 2021; Hofmarcher et al., 2020; Jeanrenaud et al., 2012; Kristensen et al., 2022; Lucchini and Comi, 2022), and direct cost in two studies (VCEC, 2012; Whetton et al., 2021). In studies reporting direct and indirect costs only, the share of direct costs ranged from 1.4% (HSPRG, 2002) to 14.8–69.1% (Thorley et al., 2016) of the total cost. Conversely, the share of indirect costs ranged from 30.9 to 85.2% (Thorley et al., 2016) to 98.6% (HSPRG, 2002).

Studies included varying numbers of cost items (Fig. 2). For studies including direct, indirect, and intangible cost categories, the number of included cost items ranged from five (Jeanrenaud et al., 2012) to 32 (Browne et al., 2017). The three studies with the highest number of cost items were conducted in Australia (Browne et al., 2017) ( $n = 32$ ), Northern Territory of Australia (Whetton et al., 2021) ( $n = 29$ ), and Norway (Kristensen et al., 2022) ( $n = 23$ ). Total costs in studies that had examined direct, indirect and intangible cost ranged from 16 Int\$ per adult (OHID, 2023) to 36,144 Int\$ per adult (Winkler et al., 2016).

The three highest total cost estimates were produced in European studies. The estimates of Winkler et al. (2016) in the Czech Republic yielded 31,594–36,144 Int\$ per adult with 19 cost items, of which 10

were intangible. In Sweden, a 2020 report estimated a cost of 18,771 Int\$ per adult, with 20 cost items of which four were intangible (Hofmarcher et al., 2020). A 2021 Swedish update report resulted in a total cost of 17,438 Int\$ per adult, including 17 cost items, of which three were intangible (Gustafsson et al., 2021). (Table 3, Fig. 2).

The lowest estimates including all cost types were produced in England. In 2023 OHID (2023) estimated a total cost of 16 Int\$ per adult, using seven cost items of which two were intangible. PHE (2021) produced a total cost of 23 Int\$ per adult with six cost items, of which one was intangible. Finally, an Italian report (Lucchini and Comi, 2022) estimated total costs at 35 Int\$ per adult with eight cost items including one intangible cost.

In studies including only direct and indirect costs, total costs ranged from 4 Int\$ per adult (Thorley et al., 2016) to 838 Int\$ per adult (Thompson and Schwer, 2005). For all the studies that had examined direct and indirect cost, the average cost was 2,318 Int\$ per adult. Overall, costs ranged from 6 to 324,000 million int\$ in the total, with an average of 3,980 int\$ per adult and median 449 int\$ per adult (Fig. 2).

### 3.4. Methodological differences

Most studies ( $N = 24$ ) adopted a broad view of social costs as any negative (financial) outcomes to society. Only two studies (Fong et al., 2011; Žofčák and Šíma, 2022) used a more narrow definition of social costs as costs that reduce aggregate societal wealth (Walker and Barnett, 1999), not accounting for costs borne by individuals and families.

APC replicated their study (APC, 1999) in 2010, utilising data from the 1999 report but adjusting the values to reflect changes in demand, the prevalence of problematic gambling, population growth, household income, and inflation. Despite the fact that multiple studies used at least parts of the methodology constructed by the APC (1999), we identified seven different methodological approaches that were applied when calculating direct and indirect costs. These were:

- using lump sums
- multiplying number of harmed gamblers by unit cost
- using logistic regression models
- causality adjustment method
- excess cost method
- attributing cost from treatment sample to whole population
- costing formula

#### 3.4.1. Definition and measurement of problematic gambling

Studies varied in terms of how they defined and assessed the prevalence of problem or pathological gambling. 18 of the included studies focused on the social cost of problematic and/or 'pathological' gambling. Other studies focused on high-risk gambling, identified by high SOGS or PGSI scores (Lucchini and Comi, 2022) or diagnosed gambling disorder (Vestergaard et al., 2023). One study employed micro-simulated data on gambling behaviour, utilising a zero-inflated ordered probit model to construct a synthetic indicator of problem gambling (Bhattacharjee et al., 2023). Six studies adopted a broader view, also including costs associated with at-risk or moderate risk (PGSI score 5–7) gambling. For example, one study examined level 2 and level 3 gambling (Westphal et al., 1999), where level 2 gambling signified behaviour with moderate impacts on personal and social life, and level 3 denoted behaviour with severe and multifaceted consequences.

Methodological differences were also visible in the tools used to assess the target group. Two studies estimated the number of problem or pathological gamblers using SOGS, eight studies employed the PGSI. One study (Gerstein et al., 1999) used the National Opinion Research Centre (NORC) DSM Screen of Gambling Problems (NODS), and two (Bhattacharjee et al., 2023; HSPRG, 2002) employed the Diagnostic and Statistical Manual of Mental Disorders, DSM-IV criteria. One study employed a Swiss-developed measure based on the DSM-IV criteria

**Table 3**  
The total cost estimates and methods used in calculations.

Ref.	Direct cost low-high mill. int \$, (% from total)	Indirect costs low-high, mill. int \$ (% from total)	Intangible costs low-high, mill. int \$ (% from total)	Total costs low-high, mill. int \$	Total costs int \$/population over 15 years	Level of gambling (and tool used)	Method
1	24.52–37.56 (3)	795.26–1,253.84 (97)	.	819.78–1291.39	14.77–23.26	PG (DSM-IV & microsimulation)	Direct & indirect: Excess cost (ARG as reference group)
2	33.49–186.68 (0.2–0.5)	192.54–820.37 (1–2)	25,722.87–35,413.72 (99–97)	16,268.05–36,420.77	298.12–667.83	PG (from other studies)	Direct, indirect, intangible: N°C
3	2,935.62 (22)	3,258.82 (24)	7,238.17 (54)	13,432.61	2,818.96	ARPG (PGSI)	Direct: N°C, Causality adjustment, Costing formula, Lump sums Indirect: Causality adjustment Intangible: Causality adjustment, BD
4	745.21 (100)	.	.	745.21	1701.39	PG (NA)	Direct: N°C, Lump sums
5	.	.	.	907.76	286.19*	Level 2 & level 3 gamblers (SOGS)	Direct & indirect: Costs from treatment sample attributed to the whole community
6	46,314.84–52,212.85 (100)	.	.	46,314.84–52,212.85	5,169.07–5,827.33	PG (from other studies)	Direct: Revised/replicated study
7	2,899.80 (2)	109,466.78 (70)	44,612.86 (28)	156,979.44	18,770.71	PG (PGSI)	Direct: Lump sums, Causality adjustment Indirect & intangible: Causality adjustment
8	107.59 (2–0.6)	275.08–800.19 (5)	5,119.00–16,163.61 (93–95)	5,501.67–17,071.39	374.64–1,162.58	PG (SOGS, SOGS 10+)	Direct: N°C, Lump sums Indirect: N°C Intangible: Causality adjustment
9	.	.	.	10,466.84–18,706.69	610.42–1,090.96	PG (PGSI)	Revised/replicated study
10	2,272.57–3,135.48 (71–52)	57.41–308.30 (2–5)	850.47–2,551.42 (27–43)	3,180.45–5,995.19	178.45–257.41	PG (PGSI)	Direct: N°C, Lump sums Indirect: N°C, Causality adjustment Intangible: Causality adjustment
11	39,629.66–45,527.67 (14)	19,714.74–37,547.80 (7–12)	223,742.77–240,775.60 (79–74)	283,087.17–323,851.07	31,594.55–36,144.09	PG (NA)	Direct: N°C Indirect: N°C Intangible: Causality adjustment
12	7.41–10.50 (10–3)	5.76–27.58 (8–7)	43.6–235.50 (83–90)	62.98–340.22	189.68–942.24	PG (PGSI)	Direct: N°C, Lump sums Indirect: N°C, Causality adjustment Intangible: Causality adjustment
13	123.20 (16–9)	180.78 (23–14)	467.60–998.17 (61–77)	771.58–1,302.14	16.35–27.59	ARPG (PGSI, DSM-IV)	Direct & indirect cost: Excess cost (non-gamblers as reference group, RR) Intangible: Excess cost & BD
14	198.85 (13)	577.86 (38)	738.67 (49)	1510.39	22.28	ARPG (PGSI)	Direct & indirect cost: Excess cost (non-gamblers as reference group, OR) Intangible: Excess cost & BD
15	589.84 (33)	967.03 (54)	223.37 (13)	1,780.25	35.15	HRG (PGSI, SOGS)	Direct: Lump sums, N°C, Causality adjustment (RR) Indirect & intangible: Causality adjustment (RR)
16	35.49–1,943.27 (15–69)	204.09–869.59 (85–31)	.	.	4.44–52.12	PG (PGSI, DSM-IV)	Direct & indirect cost: Excess cost (non-PGs as reference group, OR)
17	140.19 (1)	9,453.68 (99)	.	9,593.87	44.36	Pathological & PG (NODS)	Direct & indirect: Excess percent
18	.	.	.	.	483.56–838.02*	Pathological & PG (NA)	Direct & indirect: Cost profile for problem gambler converted to society costs
19	150.46 (47)	172.24 (53)	.	322.70	4.59	PG (DSM-IV & SOGS)	Direct & indirect: N°C
20	11,367.23 (16)	33,517.32 (47)	26,128.89 (37)	71,013.44	16,231.64	PG (PGSI)	Direct: Lump sums, Causality adjustment Indirect & intangible: Causality adjustment
21	.	1,169.77 (100)	.	1,169.77	242.99	GD (diagnoses)	Indirect: N°C, (health registers), Excess cost

(continued on next page)

Table 3 (continued)

Ref.	Direct cost low-high, mill. int.\$, (% from total)	Indirect costs low-high, mill. int.\$ (% from total)	Intangible costs low-high, mill. int.\$ (% from total)	Total costs low-high, int.\$	Total costs int \$/population over 15 years	Level of gambling (and tool used)	Method
22	6.34 (7)	12.85 (15)	67.05–261.70 (78–93)	86.24–280.88	194.62–633.91	HRG & PG (PGSI)	Direct & Indirect: N°C (GHM) Intangibles: N°C (GHM), BD
23	0.88 (1)	6.22 (99)	.	6.31	9.76	Pathological & PG (DSM-IV)	Direct & indirect: N°C
24	187.91–262.94 (63–38)	52.66 (18–8)	56.81–371.86 (19–54)	297.38–687.46	1534.37–3547.00	ARPG (CPGI)	Direct: N°C, Lump sums Indirect: N°C
25	9.00 (2–1)	453.29–478.40 (78–70)	120.87–199.47 (21–29)	583.17–686.88	583.17–686.88	Pathological & (DSM-IV derived)	Intangible: BD Direct & indirect: N°C
26	2,279.93 (2)	75,609.24 (64)	40,915.03 (34)	118,804.21	17,437.87	PG (PGSI)	Intangible: Logistic regression Direct: Lump sums, Causality adjustment Indirect & intangible: Causality adjustment

**Note.** Costs are presented in 2023 international dollars (int \$) to allow comparability. Total costs are presented as cost per resident over 15 years of age within the jurisdiction. In some cases, % of total cost do no sum up to 100% because of rounding.

Abbreviations PG = problem gambling, ARPG = at-risk and problem gambling, ARG = at-risk gambling, HRG = high risk gambling, GD = gambling disorder, GHM = Gambling Harm Measure, DSM-IV = Diagnostic and Statistical Manual of Mental Disorders, SOGS=South Oaks Gambling Screen, PGSI= Problem Gambling Severity Index, NODS= NORC DSM Screen of Gambling Problems, NA = not available, N°C = number of gamblers multiplied by unit cost, BD = burden of disease approach. \* Population over the age of eighteen was applied.

(Jeanrenaud et al., 2012). Two studies combined the PGSI with the SOGS (Becker, 2011; Lucchini and Comi, 2022) while others combined the PGSI with the DSM-IV (OHID, 2023; Thorley et al., 2016). One study used health register data on patients treated for gambling disorder (Vestergaard et al., 2023). Some studies used prior research as the basis for their estimates of total numbers of affected gamblers (Chalaguine, 2018; Žofčák and Šíma, 2022). For example, Chalaguine (2018) calculated the prevalence of problem gambling using estimates from two studies and by calculating the average of lower and upper bound estimates of the number of individuals with a gambling problem, summed up and divided the sum by the number of population estimates. Some studies did not specify how they had estimated the number of harmed gamblers (Fong et al., 2011; Thompson and Schwer, 2005; Winkler et al., 2016).

#### 3.4.2. Using lump sums and multiplying number of harmed gamblers by unit cost

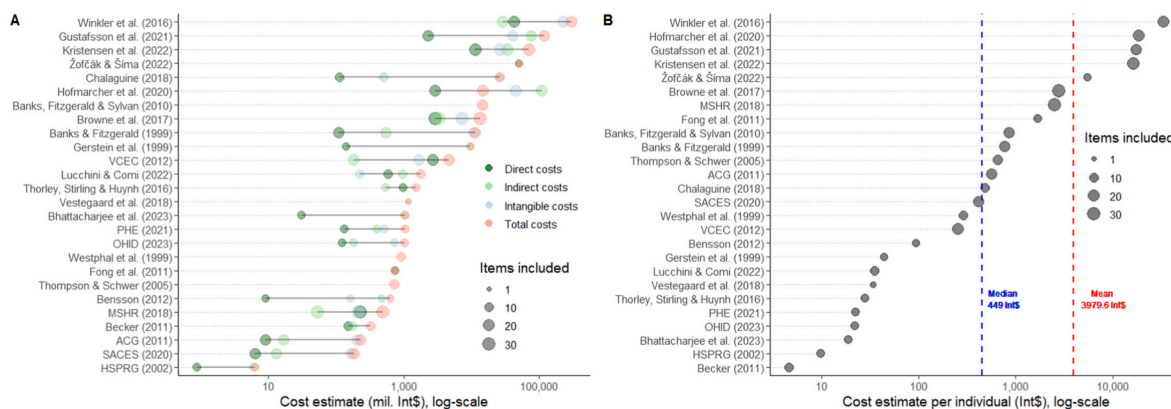
The most straightforward method for calculating social cost was to use lump sums from the total expenses related to preventive measures by different organisations or from earmarked grants. However, in most of these studies direct and indirect cost were calculated by multiplying the number of harmed gamblers by unit cost of harm. The number of harmed gamblers was estimated using either administrative statistics or by utilising data from surveys, or a combination of these. Administrative statistics on costs were retrieved for example from reports of national addiction services (Lucchini and Comi, 2022) or from health care registers (Vestergaard et al., 2023). In some cases, estimating the costs from administrative statistics involved a degree of guesswork. For example, the study by Fong et al. (2011) made assumptions on the number of gambling-related criminal cases that were sent to court to calculate costs related to promoting gambling and rent-seeking. Besides administrative statistics and survey data, some studies relied on expert opinions (ACG, 2011; APC, 1999; Browne et al., 2017; Fong et al., 2011; VCEC, 2012).

Other studies used survey data from population surveys, treatment data, convenience samples, or combinations of these. For example, Gerstein et al. (1999) used two surveys, one telephone survey and one patron survey, to improve data accuracy, as problem and pathological gambling were less common in the telephone survey than in the patron survey. O'Neil et al. (2021) produced survey data that prompted individuals who gamble on their perceived effects of gambling. They called this the 'gambling harm measure approach'. Like in other studies, the number of individuals with problematic gambling was multiplied with unit cost of harm.

When available, most recent national prevalence data were used. When such data were unavailable, some studies relied on older data or data from other countries. For example, in Sweden (Hofmarcher et al., 2020), international statistical estimates on criminal activities or decreased workplace productivity were used when Swedish data were not available. In the study conducted by O'Neil et al. (2021), cost of harms was retrieved from APC's report (1999) and updated to 2019/20 values by the authors. Similarly, prevalence estimates for less frequent harms were taken from the same report.

#### 3.4.3. Attributing cost from treatment sample to whole population

Some studies extrapolated cost estimates based on treatment samples to the whole community using the proportionate model (Westphal et al., 1999) or by creating a cost profile for problem gamblers and converting it to society-level costs (Thompson and Schwer, 2005). Thompson and Schwer (2005) used data from Gamblers Anonymous (N = 99) in Southern Nevada and multiplied identified costs by an estimate of the total number of pathological and problem gamblers in the area. Westphal et al. (1999) used a treatment sample to assess lifetime gambling harms, and a telephone survey to assess past year gambling harms. Social costs were estimated by comparing the average SOGS score in a telephone survey to the average SOGS score in a treatment sample. Annualised social cost estimates for telephone survey respondents were



**Fig. 2.** A. Log-transformed ‘middle’ cost estimates for direct, indirect, intangible, and total cost. **Fig. 2B.** Log-transformed total cost (per adult individual) estimates with mean and median estimate values as vertical lines.

calculated by multiplying identified costs with the total estimated number of individuals experiencing problematic gambling in Louisiana.

#### 3.4.4. Causality adjustment method

Because the unknown direction of causality, some studies used causality adjustments when estimating direct and indirect costs (ACG, 2011; Browne et al., 2017; Gustafsson et al., 2021; Hofmarcher et al., 2020; Kristensen et al., 2022; Lucchini and Comi, 2022; VCEC, 2012). Originally, causality adjustments were only used for intangible costs, with the APC (1999) applying an 80-percent causality adjustment for family and personal costs. This assumption was made based on the expectation that approximately 20 percent of individuals would have experienced harm regardless of gambling.

In terms of thresholds, adjustments of 80 or 50 percent have been used depending on the levels of certainty according to which specific costs can be attributed to gambling (Hofmarcher et al., 2020; Kristensen et al., 2022). To prevent double-counting harms, more severe cases are excluded from the estimates of less severe cases. For instance, individuals with suicidal thoughts are excluded from the estimates of those experiencing depression. Unlike other studies that used causality adjustment for estimating direct and indirect costs, Lucchini and Comi (2022) also applied relative risks to compute the number of harmed high-risk gamblers and then multiplied this estimate with the average unit cost per person. Costs were discounted by 20 percent to account for the uncertainty around causality.

#### 3.4.5. Costing formula

Some studies also examined excess spending on gambling (Browne et al., 2017; VCEC, 2012; Whetton et al., 2021). The approach adopted by the APC (1999) and the VCEC (2012) posits that, on average, non-problem gamblers make rational decisions regarding their annual gambling expenditures, aiming to maximise utility. Consequently, any excess spending by problem gamblers beyond this average was regarded as incurring an opportunity cost to the gambler. In the Northern Territory, excessive spending was estimated based on problem gambler expenditure on electronic gambling machines (Whetton et al., 2021). It was assumed that, in the absence of a gambling problem, these individuals would have similar expenditure as low risk gamblers.

Browne et al. (2017) estimated excessive spending using a costing formula that adjusted the total spending on gambling to different gambling severity levels. For individuals identified as problem gamblers (according to the PGSI), 80% of spending exceeding the level of non-problematic gambling was considered a cost. For low-risk gamblers, approximately 40 percent of excessive spending was regarded as a cost.

#### 3.4.6. Excess cost method and using logistic regression models

The excess cost method consists of adjusting harms attributed to

problem and pathological gambling to expected rates of harm. Cost estimates equate to excessive costs experienced by those with problem or pathological gambling, compared to non-gamblers or non-problem gamblers. The method was applied in six studies. Gerstein et al. (1999) used a method comparing the observed rate of an outcome (such as job loss) amongst identified problem gamblers, with the expected or typical rate in the general population. This excess rate was then applied to an associated cost. A similar method was employed, and expanded, in later studies (Bhattacharjee et al., 2023; OHID, 2023; PHE, 2021; Thorley et al., 2016; Vestergaard et al., 2023). Thorley et al. (2016) conducted multiple regression models to analyse how much more likely problem gamblers were to experience harms than an average member of the population. PHE (2021) used a similar method, but calculated the cost for at-risk and problem gambling, whereas the OHID (2023) calculated relative risk rather than odds ratios. A recent application of the excess cost method (Bhattacharjee et al., 2023) compared costs of problematic gambling to at-risk gambling rather than to non-problematic gambling, as had been the case in earlier studies. One study (Vestergaard et al., 2023) conducted in Denmark, used excess cost when estimating loss of productivity.

Aside from logistic regression models in the excess cost method, one study (Jeanrenaud et al., 2012) also employed logistic models to determine how much lower the income of pathological gamblers was. In this study, several models were created, controlling for different socio-demographic characteristics (age, sex, gender, education, nationality, self-employment) and alcohol use. Based on these models, the study showed that pathological gambling was associated with a decrease in monthly personal income of around 1,000 Swiss francs. This amount was then multiplied by the number of problem gamblers to estimate the productivity losses associated with pathological gambling.

#### 3.4.7. Examining intangible cost by causality adjustment and utilising burden of disease approach

The two central methodological questions with regard to intangible costs were how to assess the magnitude of harms and how to monetarise them. The most common way to evaluate the magnitude of intangible costs was the causality adjustment method. This method was applied in eight studies. With causality adjustment, studies used the averages of victim compensation payments or the gross annual average income for years of life lost for a monetary valuation. Similarly, to calculate direct and indirect costs, causality adjustment was used to adjust to the unknown direction of causality.

Other studies applied the burden of disease approach. Browne et al. (2017) used this method to estimate average disability weights (DW) for emotional and psychological distress associated with different levels of gambling severity. The DW metric represents the overall impact of a condition on individual quality of life. DWs range from no impact (0),

reflecting normal health and wellbeing, to an extreme illbeing (1). When integrated over the span of one year and across individuals, DW equates to a 'disability-adjusted life year' (DALY), which can be interpreted as a cost when monetarised by multiplying it with Gross domestic product (GDP) per capita.

O'Neil et al. (2021) estimated DALYs using Global Burden of Disease Collaborative Network (2017). The DALY for severe psychological harm was estimated based on the DALY for 'Moderate Anxiety Disorder'. The estimate was reduced by half based on the assumption that problematic gambling will be asymptomatic half of the time. The same approach was applied in the study conducted by Whetton et al. (2021). In this study a monetary value of DALYs was attributed using the total economic value of a statistical life (VoSL, the amount of money society is willing to spend to avert one potentially preventable premature death). The assumption behind this approach is that the value of a DALY is equivalent to that of a statistical life year (VoSLY). The VoSL is treated as a lump sum that reflects a series of annual payments spread over the remaining expected lifespan of the target population – typically assumed to be 40 years (Abelson, 2008).

In the PHE (2021) and OHID (2023) reports, the intangible costs of suicide and depression were calculated based on the loss of quality and length of life, measured in QALYs (Quality-Adjusted Life Years). In these reports, the approach to monetisation was based on the cost of QALY, quantified in HM Treasury's Green Book (HM Treasury, 2022). The Green Book provides guidance on how to appraise policies, programs, and projects.

#### 4. Discussion

This scoping review focused on evaluating the outcomes and methodologies of studies assessing social costs of gambling. The systematic search yielded 26 relevant studies, representing 19 countries and jurisdictions, 18 of which were in the Global North. As also identified in prior methodological discussions (APC, 1999, 2010; Browne et al., 2017; Grinols, 2004; VCEC, 2012; Walker and Barnett, 1999), methodological choices have an important impact on social cost calculations. Our review showed differences in terms of included cost types, applied calculation methods, examined levels of problematic gambling, and how unknown causality was taken into consideration.

##### 4.1. Total costs

Differences across studies limited our possibility to conduct a meta-analysis. However, we were able to compare total cost estimates. Our comparison of total costs across studies, standardised into 2023 international dollars proportionate to population size for 15 years of age and older, shows that total costs vary greatly between calculations. Total costs average at 3,980 int\$ per adult. Due to methodological choices in the included studies, this average estimate is likely to be conservative. Yet, our results indicate that many of the positive economic effects of gambling, as promoted by industry interests (Wardle et al., 2024; De Lacy-Vawdon et al., 2023; Reith and Wardle, 2022), are offset by social costs.

Estimates varied to a significant degree, as highlighted by the substantial difference between the average and median per-adult total cost estimates (3,980 int\$ and 449 int\$, respectively). The lowest proportional estimates were 5 int\$ (Becker, 2011) and 10 int\$ (HSPRG, 2002). In these studies, the cost was provided for pathological or problem gambling only and using under ten cost items excluding all intangible costs. In contrast, the highest proportional estimates were provided by Winkler et al. (2016), estimating a total cost of 33,869 int\$ per adult. The study included a total of 19 direct, indirect, and intangible cost items.

The number of included cost items explains a part of the wide variation in total cost estimates. For example, Žofčák and Šíma (2022) used a similar methodology to Winkler et al. (2016), with the difference that

the former included five cost items, and the latter included 19. Žofčák and Šíma (2022) arrived at a total cost estimate of 5,498 int\$ while Winkler et al. (2016) reached a total cost estimate of 33,869 int\$. However, number of cost items alone is not a sufficient explanation, and other methodological differences or different perspectives on costs can also have a significant effect.

Hence, the relationship between cost estimates per adults in population and the number of cost items seems to be nonlinear. For example, VCEC (2012) included 20 cost items, but the proportional total estimate was under 180 int\$. In comparison, Hofmarcher et al. (2020) also included 20 cost items but arrived at a total cost estimate of 18,770 int\$. Fong et al. (2011) included only seven direct costs and still estimated the total cost at 1,700 int\$ per adult in population. These estimates used existing statistics for included costs (for example, registers of treatment centres and justice system), following the 'economist view of social cost' (Walker and Barnett, 1999; Eadington, 2003).

Our results can be compared to available estimates of total social costs of alcohol use. A systematic review estimated the mean costs of alcohol use at 817.6 Int\$ per adult in year 2019 (Manthey et al., 2021). In 2023, this value would be approximately 956 Int\$ per adult (adjusted for an estimated average global inflation rate of 4% per year). This is significantly lower than our mean estimate. Even if only direct and indirect costs of gambling are included for comparability, the total cost estimate for gambling is 2,318 Int\$ per adult. When comparing the mean costs, the cost associated with gambling appears surprisingly high, particularly given that problematic alcohol use is more prevalent (e.g. Nordmyr et al., 2016) The prevalence of heavy drinking ranges from <1.0% to 53.0% (Dagne et al., 2024). In contrast, the prevalence of problem gambling globally is estimated at 1.41% and the prevalence of any risk gambling at 8.7% among adults (Tran et al., 2024). It is possible that for individuals, the burden of harm associated with gambling can be higher than for alcohol. Gambling often results in significant financial losses, debt, legal issues, and social consequences that directly affect personal finances. Alcohol is likely to have lower direct financial costs, although it may be associated with higher long-term health costs.

##### 4.2. Differences in categorisations

Existing studies divide social costs of gambling into broad categories of direct, indirect, and intangible costs. Each study in this review included a calculation of direct costs, such as crime- and treatment-related costs, as well as indirect costs, such as broader work and health care-related costs. Over half of the studies (15/26) also included intangible costs in their calculations. The included cost items varied across studies, but the most often-cited items comprised emotional distress, and suicidality. 12 studies also included intangible costs to family members.

In some studies, the inclusion of intangible costs resulted in higher overall social cost estimates. Studies including a high number of intangible cost items (Browne et al., 2017; Kristensen et al., 2022; Winkler et al., 2016) produced comparatively high total cost estimates (13,432–303,469 million int\$). However, studies with a high number of intangible cost items had a high number of cost items overall. The relationship between number of cost items and total costs is not straightforward, and some studies with a lower number of intangible costs also found high levels of total cost. For example, comparing two Nordic contexts, Kristensen et al. (2022) included 11 intangible cost items, but only considered costs of problem gambling to society. They arrived at a total cost estimate of 16,231 int\$ per adult. Gustafsson et al. (2021) included only three intangible cost items but considered costs of at-risk gambling in addition to those of problem gambling, arriving at a similar total cost estimate of 17,437 int\$ per adult in population. The role of intangible cost items in calculations can therefore vary and depend on other factors considered in calculations.

We also found that the categorisation of cost items into direct, indirect, and intangible costs varies, reflecting different definitions and

jurisdictional contexts. Countries and jurisdictions differ in terms of their legal, social, and healthcare systems, and this has direct implications for how costs are calculated and where the responsibility for these costs lies. For instance, treatment service provision for problematic gambling can be organised by health or social care depending on the context. Jurisdictions further differ in terms of how these services are financed. In taxation-based universal systems, health care costs accrue to societies. In insurance-based systems, costs are borne by insurance-holders and are less direct. If service provision is based on voluntary work, treatment may not even entail important calculable costs. This can partly explain the high level of costs in countries such as Norway and Sweden that have extensive public service provision.

#### 4.3. Methodological differences

Most included cost calculations employed the prevalence-based method combined with lump-sum statistics. Many studies also applied the method originally developed by the APC (1999). However, studies were unable to easily monetise all cost items. Notably, the monetary evaluation of intangible cost was at best arbitrary or even impossible (cf. Anielski and Braaten, 2008). Difficulties in measuring intangible costs were further aggravated by their significant share within social costs. More recent studies have utilised the burden of disease approach (Bhattacharjee et al., 2023; Browne et al., 2017; OHID, 2023; PHE, 2021), measuring costs with QALY and YLL calculations that have produced more precise evaluations, but even these have not been able to consider subjective variations in the experience of harm. Furthermore, the cost of illness approach may be more appropriate for calculations on the social costs of substance-based addictions rather than those of gambling, as financial issues rather than health impacts have more bearing in the gambling field (cf. Muggleton et al., 2021).

The prevalence-based method also restricted most studies to measuring the social costs of *problematic gambling*, rather than measuring the social costs of harmful gambling or gambling more generally. This methodological choice is likely to result in underestimations of the costs. Prevalence surveys underrepresent the true extent of problematic gambling (e.g., Scholes et al., 2008). Furthermore, literature on the prevention paradox (Browne and Rockloff, 2018, 2017; Browne et al., 2020) has shown that the greatest burden of many gambling harms accrues to at-risk gamblers rather than those gambling at problematic or disordered levels, due to the significantly higher number of the former in populations. The prevention paradox argument also acknowledges that gambling harms occur on a continuous spectrum, in line with the understanding of the WHO (cf. Browne and Rockloff, 2017). As an example, the social cost estimates conducted in Sweden (Gustafsson et al., 2021) and Norway (Kristensen et al., 2022) utilised broadly the same methodology, with the exception that the Norwegian calculations measured the costs of problematic gambling only, while the Swedish calculation also included the costs of at-risk gambling. This methodological difference was reflected as a higher total cost for Sweden, despite a lower number of cost items included. In contrast, PHE (2021) and the OHID (2023) reports of social costs in England used the same definitions including harmful and at-risk gamblers yielding a very similar results for total costs.

#### 4.4. Existing gaps

Going forward, studies addressing the social costs of gambling should include a wide range of social cost items and consider costs to all affected population groups, not only those identified as ‘problem gamblers’. Furthermore, it is necessary to account for more general costs and harm to societies related to the provision of gambling. These span beyond the existence of problematic or even at-risk gambling. For example, gambling is connected to crime on multiple levels, ranging from criminal acts committed by those engaging in gambling to money-laundering and criminal involvement in the supply of gambling (Binde

et al., 2022). In addition, the provision of gambling can produce a range of other costs to societies, including substitution and opportunity costs, residential area degeneration, and even negative impacts on community and socio-cultural identities (Marionneau et al., 2023). These types of societal costs were not considered in existing social cost studies. Even crime-related items in our review only included crime perpetrated by those experiencing problematic gambling.

Even though methodologies and data availability have improved during the reviewed years (1999–2023), there are still questions related to data quality. Many social cost estimates are significantly limited by data availability. As a result, study approaches vary across contexts and nations depending on available information causing possible distortion in the estimates. In some cases, calculations have been based on outdated data, best guesses, or data from other jurisdictions. Hofmarcher et al. (2020), for example, used data from the APC (1999) to calculate crime and legal costs in Sweden, despite societal and temporal differences. Similarly, in earlier calculations (Gerstein et al., 1999; Thompson and Schwer, 2005), treatment data were used to estimate different cost items per ‘problem gambler’. This can distort the overall cost calculations, as individuals seeking treatment are more likely to experience more severe harm than those who have not sought treatment (Harries et al., 2018). Research also shows that only a minority of those experiencing gambling harm seek treatment (Bijker et al., 2022). Lack of access to data creates important gaps in existing methodologies in terms of what kinds of social costs can even be measured. Lacking data was reflected in the calculations as a variety of assumptions and conditions that were more theoretical than factual. Without data and established calculation methods, social cost estimates can be underestimates and appear insignificant in comparison to social benefit estimates.

Better data and standardised methodologies are needed to develop a gold standard for social cost calculations in the field of gambling. In more recent calculations, sophisticated methodologies including logistic regression models have enabled a better consideration of demographic factors and the relationship between different cost items in calculations using traditional frequencies or self-assessments. Studies that use the same methodology and the same number of cost items, such as those conducted in Britain (Bhattacharjee et al., 2023; OHID, 2023; PHE, 2021; Thorley et al., 2016), arrive at very similar total cost estimates (1, 037–1,526 million int\$ or 19–28 int\$ per adult in population). This would suggest that it is possible to find a gold standard for calculating comparable total costs also across societies.

Limited access to data, while challenging to empirical investigation, can also present opportunities for further exploration and innovation in comparative analyses over time and among control communities, as noted by Williams et al. (2011). This view aligns with an observation made by Robin Room (2012) in the field of alcohol studies, highlighting the significance of social cost studies as a policy tool to identify what kind of data and monitoring are needed.

#### 4.5. Moving towards an international standard

The contested nature of social cost estimates in the gambling field highlights the critical importance of producing reliable and transparent findings. Studies can face intense scrutiny from industry actors, reflecting broader efforts to discredit research and undermine societal harms (Wardle et al., 2024). To guarantee scientific rigour of social cost estimates, a standardised and internationally recognised approach is needed. To support the development of such standardised methodologies for calculating the societal costs of gambling, we recommend the following steps:

1. **Defining the scope and generating standard methods for measuring gambling-related harms:** A common understanding on the ‘costs of gambling’ is needed, alongside acknowledgement of the key components of these costs. Based on this review, particular emphasis should be placed on direct costs, where the causal link

**Table 4**  
Steps towards the standard of estimating social costs of gambling.

Steps	What is needed	Practical steps
Defining the scope and generating standard methods for measuring gambling-related harms	A common understanding on the 'social costs of gambling' and the key components of these costs. Reliable measurements on the impact of gambling habits on health-related quality of life.  Identifying and defining who bears these costs  Addressing the broader spectrum of gambling-related harms Consider costs that are related to the provision of gambling more generally	Creating a framework for social costs of gambling (e.g. <a href="#">Latvala et al., 2019</a> ) 1) Longitudinal and meta-analytical research of gambling effects 2) Using logistic regressions assessing risk ratios 3) Developing a way to monetarize the effects reliably (e.g. <a href="#">Browne et al., 2017</a> ; <a href="#">PHE, 2021</a> ; <a href="#">OHID, 2023</a> ) Itemising costs to individuals, CSOs and different societal actors (e.g. <a href="#">Browne et al., 2017</a> ) Research on the effects of harmful gambling and calculating costs related to it (e.g. <a href="#">Browne et al., 2017</a> ; <a href="#">OHID, 2023</a> ; <a href="#">PHE, 2021</a> ) Including costs such as corruption, economic substitution, match fixing or systemic fraud, environmental damage and animal suffering ( <a href="#">Marionneau et al., 2023</a> )
Standardise cost categories and metrics	Specifying the ways to measure and monetarize each cost Calculating costs in a comparable currency	1) Presenting costs separately as direct, indirect, and intangibles costs 2) Metrics used to measure each cost needs to be specified. Utilisation of international dollars (int\$) or alternatives to ensure comparability
Investment in data infrastructure	Developing and maintaining robust systems for collecting comprehensive data on gambling-related harms and impacts	1) Utilising administrative databases when available. 2) Developing and standardising databases across jurisdictions: requiring statistics on key cost elements as part of gambling harm monitoring
International collaboration	Establishing partnerships between researchers, policymakers and organisations	1) Creating collaboration across nations 2) Research collaboration for general framework of costs
Transparency and open access	Open science	Sharing methodologies, data and results in an open access format

between gambling and the cost is more clearly established. In contrast, more effort needs to be put into developing reliable measurements on the impact of gambling habits on health-related quality of life. Studies should also place greater emphasis on identifying and defining who bears these costs, e.g., individuals, societies, or gambling operators (as in the case of rent-seeking costs). Further, studies should not concentrate only on problematic gambling but should also address the broader spectrum of gambling-related harms. Calculations should also consider costs that are related to the provision of gambling more generally, not only harmful gambling behaviours.

- 2. Standardise cost categories and metrics:** Cost should be presented separately as direct, indirect, and intangibles costs. Metrics used to measure each cost type (e.g., healthcare utilisation costs, lost workdays) also need to be specified. Calculating costs in international dollars (int\$) could provide a standardised measure, allowing for better comparison across different countries and economic contexts.
- 3. Investment in data infrastructure:** Better data leads to better research. There is a pressing need to develop and maintain robust systems for collecting comprehensive data on gambling-related harms and their health, economic, and social impacts. Wherever possible, administrative statistical data should be prioritised in cost calculations because self-reported data from surveys may be more open to individual interpretation, particularly for sensitive topics such as gambling. Administrative data can be derived from sources such as crime statistics, employment and productivity records, and health system databases. These types of data can provide more objective and accurate insights into the extent and nature of gambling harms but also be more easily standardised across jurisdictions. However, certain costs may be infeasible to estimate solely through administrative data. In such instances, it is advisable to utilise recent, representative survey samples.
- 4. International collaboration:** Establishing partnerships between researchers, policymakers, and organisations is essential to creating consensus-driven guidelines.
- 5. Transparency and open access:** Open sharing of methodologies, data, and results should be encouraged to enhance credibility and facilitate cross-jurisdictional comparisons.

By taking these steps presented also in [Table 4](#), social cost calculations can move towards a more cohesive and impactful approach.

#### 4.6. Limitations

The aim of the current paper was to present the results of a scoping review of existing social cost calculations for gambling. While we have been able to produce an overview of this field, our study is also subject to certain limitations.

First, our scoping review relies heavily on grey literature and reports due to a paucity of peer-reviewed literature in the field. Second, half of the included studies have not disclosed their funding sources, potentially leading to bias. Due to the lack of disclosure, the extent of possible bias could not be assessed in this study. Third, the included literature mainly represents societal contexts in the Global North. This may be partly due to linguistic limitations in the research team, but also due to existing gaps in monitoring and data on gambling-related harms in the Global South (cf. [Tran et al., 2024](#)). Further studies should focus particularly on contexts in the Global South where the gambling industry is growing rapidly, but research on harms and costs remains in its infancy. Additionally, in two studies ([Thompson and Schwer, 2005](#); [Westphal et al., 1999](#)), the number of over 18-year-olds in the population was used instead of over 15-year-olds. Also, one study did not specify which year the costs were based on, so we had to use the year the survey was conducted ([Thompson and Schwer, 2005](#)).

Fourth, disaggregation in available cost calculations focus on gambling severity rather on different gambling types. Research consistently highlights that EGMs, both online and land-based, are among the most harmful forms of gambling due to their high potential for addiction ([Russell et al., 2023](#)). Only two reviewed studies separated costs based on different types of gambling ([APC, 1999](#); [Becker, 2011](#)), with both indicating that EGMs incur the highest costs. This limited our ability to systematically analyse the role of provision in cost variations. Given that EGMs are associated with high levels of gambling problems, and other included studies had a particular focus, the costs related to EGMs may be emphasised across reviewed estimates. In other papers, it was not always clear which gambling formats were included (e.g., [Fong et al., 2011](#)) even though the studies presumably considered all types of gambling. Jurisdictions also differ in terms of which gambling formats are legally available. In addition, the increase of online gambling challenges existing gambling type categorisations. This lack of detail poses challenges to interpreting whether observed differences in cost estimates are due to the nature of the gambling activity, differences in methodologies, or both.

However, as individuals often participate in more than one type of

gambling and online gambling making the types overlap even more, separating costs associated with each product category would be challenging but also superficial for the more recent calculations, as it may not accurately capture the complexities and nuances inherent in the gambling behaviours. Participation in different gambling formats complicates the attribution of specific costs to individual gambling types, as the harms may stem from individual products or from the cumulative effect of multiple gambling behaviours. Similarly, pathways leading to gambling-related harm can be influenced by various factors, including gambling frequency, intensity, and individual vulnerabilities, alongside gambling types.

To address this complexity, future research could employ methodologies that account for co-participation in multiple gambling types. This could include collecting detailed individual-level data on gambling patterns or using modelling approaches to estimate the proportional impact of different activities. Such efforts would provide a more accurate understanding of the interplay between gambling types and the societal costs associated with them.

## 5. Conclusion

Overall, this scoping review has shown that while we are still far from a gold standard for measuring the social costs of gambling, some recommendations can be drawn from prior studies. The development of a gold standard could build on the WHO's guidelines for calculating the social costs of substance use (Single, 2003), but it would also need to acknowledge the idiosyncrasies of gambling in producing a wide variety of harms, and notably financial harms.

This paper has laid the foundation for a standardised methodology by identifying key methodological gaps in existing literature and by proposing recommendations for future research. While the development of a global framework for social cost estimation is a long-term endeavour, it is crucial to begin these efforts now to ensure that policymakers have access to reliable data and evidence-based recommendations. Such advancements are essential to mitigating the societal harms of gambling and to fostering greater accountability. To advance the standardisation of methodologies, several key steps are essential. First, a clear scope and standardised methods must be developed to measure gambling-related harms by emphasising direct costs, health-related quality of life, and identifying the bearers of these costs. Second, cost elements should be categorised as direct, indirect, and intangible, with specific metrics for each type. International dollars (int\$) should be adopted for global comparability. Third, investment in robust data infrastructure is critical. Objective administrative data needs to be prioritised for accuracy and reliability. Fourth, international collaboration among researchers, policymakers, and organisations is necessary to establish consensus-driven guidelines. Finally, transparency and open access to methodologies, data, and results should be prioritised to enhance credibility and facilitate cross-country comparisons.

Social cost calculations are crucial for informing gambling policy and for developing more effective preventive and public health-oriented approaches. In a field wrought with strong commercial interests, cost calculations can offer a balance to industry arguments that focus strongly on the financial benefits of gambling. Comprehensive calculations that consider both costs and benefits are needed to assess whether the negative effects of gambling, in fact, outweigh the benefits.

## CRedit authorship contribution statement

**Sari Hautamäki:** Writing – review & editing, Writing – original draft, Validation, Investigation, Formal analysis, Data curation, Conceptualization. **Virve Marionneau:** Writing – review & editing, Conceptualization. **Sari Castrén:** Writing – review & editing, Investigation. **Jussi Palomäki:** Writing – review & editing, Visualization, Investigation. **Susanna Raisamo:** Writing – review & editing, Investigation, Conceptualization. **Tomi Lintonen:** Writing – original draft,

Resources, Investigation. **Pia Pörfors:** Methodology, Data curation. **Tiina Latvala:** Writing – review & editing, Validation, Project administration, Investigation, Funding acquisition, Formal analysis, Conceptualization.

## Ethics approval

This study was a scoping review utilising existing research and therefore no ethics approval was required.

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## Declaration of competing interest

None.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.socscimed.2025.117940>.

## Data availability

The data is published research and freely available.

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